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KNOCKING ON MERCEDES' DOOR

China! A Trade Dynasty Is Born

Building The '86s

GM's Getrag High Torque Tranny

Japan's Auto Unions: No Strikes; No Outs

Cadillac's John Grettenberger with '86 Seville

AUTOMOTIVE INDUSTRIES

November, 1985/Volume 165, Number 11

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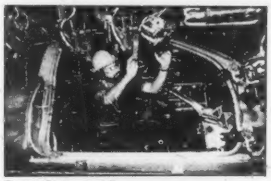
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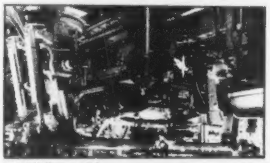
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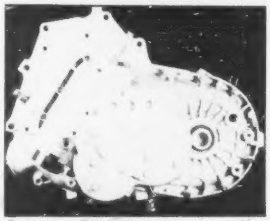
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John Grettenberger, general manager of Cadillac, with the new '86 Seville. Photo by Anthony J. Nelson.

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Strategy '86: We talk to the big boys at GM, Ford and Chrysler about sales, future product and staying lean.

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CHINA! A TRADE DYNASTY IS BORN

AI reports first-hand on China and how free enterprise is fueling its dramatic turnaround. Potential automobile demand is also explored.

by Joseph M. Callahan

Zhang Yong-Shan, a 32-year-old national guide in the People's Republic of China, says with a smile, "My wife is mean to me. She makes me do the laundry. She treats me like a washing machine."

Since "doing the laundry" in China often means beating the clothing against a rock at a nearby canal until the material is clean, Zhang is now working overtime to buy one of the new automatic washers currently available in China.

This domestic incident reflects the dramatic contrasts, the restructuring and the technological modernization now going on in China, as its 1.1 billion industrious people—a quarter of the world's population—strive to rapidly move into the 20th century. A combination of central communist direction and well-motivated free enterprise is the system being employed.

Tremendous advances have been made in almost every sphere of economic activity since Deng Xiaoping, successor to the late Chairman Mao Zedung, took charge in '76 and the new constitution was installed in '78.

Transportation Improving

Improved transportation is playing a key role in this rapid modernization. Millions of trucks, trailers, buses and other vehicles will be needed to achieve the goals set for the next 15 years.

In addition, China will probably become a major source of auto parts and other products for the US and throughout the world, as a result of the extremely low wages in China, the industriousness of the Chinese workers, and the aggressive trade programs of the Deng government. However, a slight slow-down and reassessment is now occurring.

国万岁
世界人民大团结万岁

Despite import taxes of 80% on cars in China, the People's Republic purchased 20 stretch Cadillacs last summer for $39,000 apiece for visiting VIPs.

These are my conclusions after spending 19 days in China last summer, covering over 3000 miles (*4827 km*) through 30-plus cities by bus, train, boat, taxi, airplane and even briefly on a subway.

Many Myths Prevalent

Most Americans have heard about and talked about China much of their lives. As a result we carry into China a host of myths and half-truths, frequently based on Pearl S. Buck's "The Good Earth," a solid work but one completed 50 years ago.

One of the myths is that China is a totally backward, primitive and impoverished nation. It has been that and still is for millions of people. But in many respects China is moving ahead faster than any country in the world because of the restructuring of the economy, and the stimulation coming from thousands of joint ventures with top foreign companies.

The idea has also been conveyed that the new market-driven economy is restricted to 14 coastal cities. But everywhere our tour went, which was as much as 800 miles (*1287 km*) inland to Xian and Kunming, there was evidence of free enterprise, especially among the 800 million farmers.

An example of this was the large percentage of the people who were working in the early morning or late evening on their "moonlight jobs." Under the current "responsibility system," the government allows and even encourages peasant farmers and city dwellers to operate their own businesses, often earning two or three times as much as they do from their government-assigned jobs.

Food Is Plentiful

Unlike the Soviet Union, its European satellites and other communist countries, China has an abundance of food and other products for sale. However, poverty still exists in a few of the country's 23 provinces, especially among the 55 minorities which make up about 6% of the total population. We visited people living in caves and ancient hovels, but we also saw thousands of modern high-rise apartments being built.

Another misconception is that China's huge population is spread more or less evenly throughout the country which is just a few thousand miles larger than the US.

But these hordes of people are largely crowded into the eastern third of the country, while the more extensive mountainous and desert regions are thinly populated. In fact, China actually has less arable land than the US.

While China is sometimes viewed as a militant country, one of the most amazing and favorable developments witnessed was the demobilization of one million Chinese soldiers. Some highways in southern China were filled with trucks of smiling Chinese soldiers returning to their homes.

Skeptics Wary

Skeptics quickly say, "Yes, but how large an Army does that leave China with?" The answer is that 3.2-million soldiers are still in China's army. In a parallel action, an unspecified number of Chinese weapons plants are being converted to the production of home appliances, such as automatic washers. But the weapons being made in these plants were quite old-fashioned and outmoded.

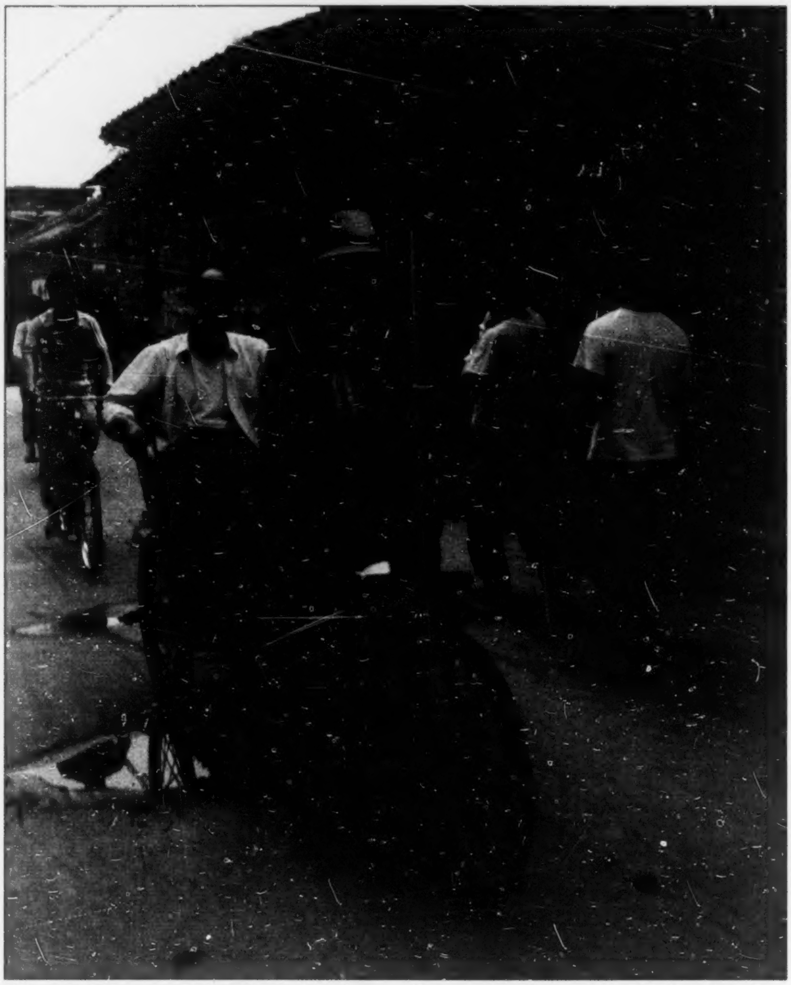
Another pleasant surprise in China was the extreme US-orientation and friendliness of the people. Repeatedly, we were stopped and questioned in the most friendly fashion.

Stephen S. Chen, GM's director of program planning-China, reports that over 250 million Chinese—more than the entire US population—now speak some English.

A History of Friendship

One Chinese guide summed up the situation, saying, "The Chinese have always been friendly to America, except when you opposed our (communist) Revolution in 1949 and when you fought us in Korea."

In the automotive sector, the potential for being in a future auto market of over a billion people and because of the low wages, virtually every auto manufacturer in the world has discussed a program of some kind with the China National Automotive Industry Corp (CNAIC) which Deng established a few years ago.



Many Chinese pedestrians and cyclists still haven't adjusted to the idea that they have to share the road with cars.

The czar-like CNAIC is well regarded for cutting red-tape. But relatively few automotive deals have been "cut" so far. And those that have been consumated are relatively small. The Japanese have been quite slow in this regard, with two small exceptions. They reportedly fear China as a low-cost competitor in the future.

CNAIC's establishment is viewed as a signal of the nation's new commitment to ground vehicle transportation. The goal is to increase vehicle production, mostly trucks, from the 270,000 units produced last year to around one million by 1990. Fruehauf Corp. is engaged in a trailer-building program of even greater growth.

During the first six months of this year, according to the official Xinhua News Agency, some 200,000 trucks and about 5000 cars were produced in China. This represents an increase of 51% over last year and 13% ahead of the government's goal for 1985.

A measure of the past poor productivity of China's auto industry, according to GM's Chen, is that last year the Chinese auto industry employed one million people in 80 vehicle assembly plants and about 2000 supplier plants to produce those 270,000 vehicles. Only some 5000 of the vehicles produced were cars, largely the Red Flag limousine produced in Shanghai for government and party officials.

(Continued)

Beijing Beginnings

In 1983 American Motors embarked on a joint venture with the Chinese government and purchased 31% of the Beijing Auto Works.

This plant has been producing the BJ212, a Russian copy of an early Jeep, for several years. Last month the Beijing Works also began assembling knocked-down AMC Cherokees. As Cherokee production builds and local sourcing for it increases, the BJ212 will be phased out.

Last fall Volkswagen AG also formed a 25-year joint venture with the People's Republic of China, agreeing to build 20,000 VW Santana models a year in Shanghai by early 1987. But VW chairman Carl Hahn announced recently that this program has been accelerated twice and now the plan is to produce 40,000 Santanas by 1987. VW also expects to assemble 500 to 1000 Audi 100s (US 5000 models) next year in China.

Last March Peugeot signed a contract to make 15,000 Peugeot 504 pickup trucks and station wagons a year near Canton by 1990. Production will begin in 1987. In addition, Italy's Fiat has agreed to build 60,000 minibuses in Nanjing.

Daimler-Benz AG has also announced plans to assemble 1000 of its now obsolete 200 and 230E models in Changchun, China, employing production equipment formerly used in the Philippines and South Africa.

In addition, Daihatsu of Japan is assembling the Hijet, a small commercial vehicle, in China. The goal this year is about 5000 units. The Chinese government has also asked Daihatsu about the possibility of assembling its Charade minicar there.

Also, the *China Trade News* reports that Isuzu Ltd of Japan is participating in a 10-year joint-venture to produce 15,000 NKR and NHR small cars a year in Chongqing.

Engines Planned

As a way of using China's low-cost labor, several companies are planning to produce vehicle engines there for export. VW expects to build 100,000 engines a year in the not too distant future and Fiat will soon be manufacturing 60,000 powerplants annually in Nanjing.

Foreign Vehicle Production Planned For China

Company	Vehicle	Volume	When	Where
AMC	BJ212	21,000	1985	Beijing
AMC	Cherokee	5000	1986	Beijing
Volkswagen	Santana	40,000	1987	Shanghai
Volkswagen	Audi 100	500-1000	1986	Shanghai
Daimler-Benz	200, 230e	1000	N.A.	Nanjing
Fiat	Minibus	60,000	N.A.	Nanjing
Diahatsu	Hijet	5000	1985	N.A.
Isuzu	NKR, NHR	15,000	N.A.	Chongqing

Total unit volume: 163,000

GM's Detroit Diesel has also worked out a heavy-duty transmission program. Chrysler and Citroen are currently negotiating engine contracts. Both GM and Ford are doing a lot of "talking" to the Chinese, but no contracts have been signed.

It now appears that "automobilization" through the import route has been moving a bit too fast for the government and for its relatively scarce foreign currency reserves. They recently declined from $12.5 billion to $11.6 billion in six months. However, the US couldn't be blamed since its trade deficit with China climbed to over $400 million in '84.

An estimated 100,000 cars were imported into China last year. The lion's share of these have been Toyota Crowns which are quite conspicuous throughout the country, often used as taxis. Toyota exports to China soared to 8500 a month late in 1984. Since then Toyota has said it will cut back its Chinese exports to 3000 a month.

Stimulating Interest

The government reportedly has been trying to stimulate interest in cars by importing several thousand tiny Polski-Fiat 126s from Poland to sell to a few individuals for $7000 each.

But alas, things apparently got out of hand, especially considering that the entire country now only has about three million vehicles, including a mere 170,000 automobiles. Consequently, last July the Beijing government announced that it was raising import taxes on cars to 80% and on trucks to 50% for all provinces.

Despite this, the People's Republic purchased 20 stretched Cadillacs replete with TV, bar and refrigerator last summer for $39,000 apiece for visiting government officials and important businessmen.

'Who's A Road Hog?'

As an observer noted, many of the Chinese pedestrians and cyclists still haven't adjusted to the idea that they have to share the road with these four-wheeled rivals. Little road construction or road repair was seen on this trip, although four limited-access highways, each about 100 miles long, are now under construction.

An important point concerning investment in China is how serious the Chinese are about continued free enterprise. In light of the fact that many average Chinese have doubled, tripled and even quadrupled their incomes since 1978, a return to a pre-free enterprise economy is going to be pretty difficult if not impossible.

Much has been written about China of late, but James Sterba of the *Wall Street Journal* possibly said it best. He said that Deng Xiaoping "has led the world's most populous nation out of two decades of economic stagnation and political chaos and into a buoyant period of economic growth and political order.

"He turned to the West and Japan for technology. He introduced competition, the profit motive and market forces." ■

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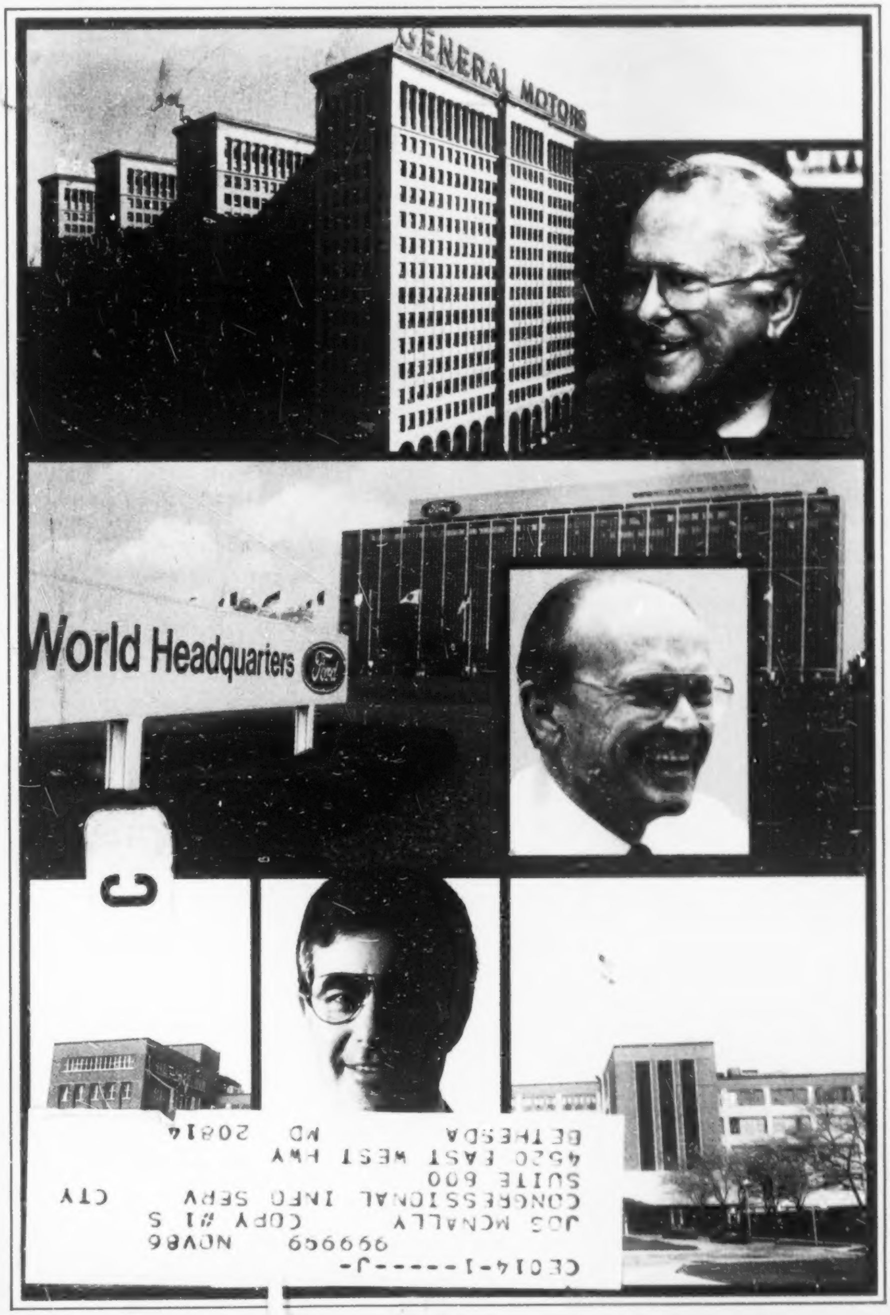
TRUCK & OFF-HIGHWAY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STRATEGY '86

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In The Driver's Seat

Petersen:
Tackling Trade

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Maseratisimo!

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AI NEWS ANALYSIS

Twelve Foreign Carmakers To Enter US By 1990

by Lance Ealey

Major New Foreign Carmakers By 1990

Company	Country	Carline(s)	Date of Entry	Anticipated Volume	Building Cars For:
Austin Rover	UK	XX, 2nd model	1987	20,000	Self
Daewoo	Korea	Opel Kadett-derived	1987	80,000	Pontiac
Daihatsu	Korea	Charade, other	1987	50,000est.	Self
Lio Ho	Taiwan	Small Car	1988	40,000	Ford
Usines Chausson	France	Sports Car	by 1990	5,000est.	Ford
Hyundai	Korea	Pony Excel, Stellar	1986	100,000	Self
		Excel model	1987	30,000	Mitsubishi
Kia	Korea	Minicar	1987	70,000	Ford
		Minicar	1988	40,000	Mazda
AIM	Greece	Desta APV	1986	20,000	Self
SEAT	Spain	Malaga	1988	50,000	Self
Skoda	Czech.	Small Car	by 1990	40,000est.	Self
Yue Loong[1]	Taiwan	March	1988	50,000	Nissan
Zastava[2]	Yugoslavia	Yugo	1986	150,000	Self
			Total	**745,000**	

[1]—Cars to be sold in North America through Nissan Dealers.

[2]—Zastava reportedly projects 40,000 Yugo sales for '86 model year, 70,000 for '87, 110,000 for '88 and 150,000 by 1989.

By 1990 at least 12 new foreign companies will be building over 700,000 cars for sale in the US market, bringing the total number of foreign automakers supplying the US to 40. Seven domestic and joint venture companies will be building cars in the United States, for a total of 47 automakers by 1990.

As recently as 1984, the total number of major automakers building cars for sale in the United States was 29.

In 1985, the number of foreign companies jumped to 28, while domestic companies, including NUMMI, the GM/Toyota joint venture, reached six for a total of 34.

The seven domestic/joint venture companies are GM, Ford, Chrysler, AMC, NUMMI, Saturn and the recently announced Chrysler/Mitsubishi joint venture, Diamond Star.

In addition to the new companies (see chart), there will be over 30 new carlines aimed at the American market by 1990. In 1985, there was a total of 172 carlines.

Joint Ventures To Come

"Most of the 12 should survive," said Tom O'Grady, director of Integrated Automotive Resources, Inc. "They're finding interesting little niches for themselves—the low-priced ones like the Yugo. There are a couple of others that could fall into that category if they price themselves like a Yugo and be a used car substitute. They're not interfering with any of the major manufacturers, any of the heavyweights.

"Theoretically," O'Grady continued, "it's possible for them all to do it. Pratically, there will be some that will stumble, and others will integrate into other firms, so instead of seeing 40, it will be reduced by a lot of joint ventures."

O'Grady admits, "there's an incredible danger in the near future, because those that have the most ambitious plans will build an infrastructure that when and if those plans aren't realized, they'll fall by the wayside. They won't be able to compete because of high costs."

The 12 new companies do not include such specialty carmakers as AC of Scotland, which will introduce the Ecosse in low volume in 1986, or UK-based Panther Co., which is bringing in the Kallista in the 1986 model year. Reliant, another British specialty car manufacturer, also has plans to enter the US market next fall.

> **"My advice to any of these companies, if they're planning on coming in by 1988, '89, '90, is move your date up quite a bit."**

Also not included are the entry-level models Volkwagen is planning to import from its Brazilian subsidiary, or companies such as Suzuki, which is currently suppling GM with the Sprint mini-car, but will bring in a version of the car under its own, newly-formed dealer network in 1988.

In the 1985 model year, imported car penetration was 24.2% or 2,680,000 cars out of a total of 11,063,000 cars sold.

Adding 700,000 to today's import penetration would raise the total percentage of cars imported to the United States to 31% in an 11-million car year, and that does not include the additional vehicles all of the Japanese carmakers are planning to introduce, including 45,000 cars from Honda's new Acura Division, or the extra cars Chrysler is hoping to import from Mitsubishi.

"My advice to any of these companies, if they're planning on coming in by 1988, '89, '90, is move your date up quite a bit," said O'Grady. "Get in fast, because the last one in may have a much harder time than the second or third. The hardest time is going to be had by the first or second. They've got to make their way as a new car company in a new niche. If they're accepted, others will come in." ■

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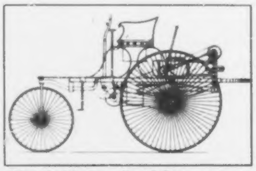
30 WHO BUILDS CARS BEST?
The people who build cars in North America doff their hats to the firstest with the mostest...again.



Who Builds Cars Best? The company that built them first, of course. Carl Benz' first patented vehicle (shown) Cover: Today's model, the 500SEC.

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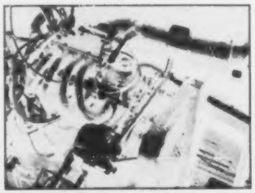

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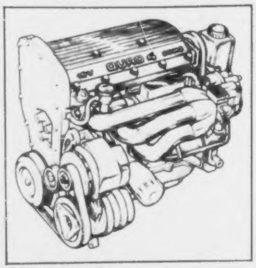

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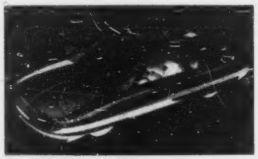

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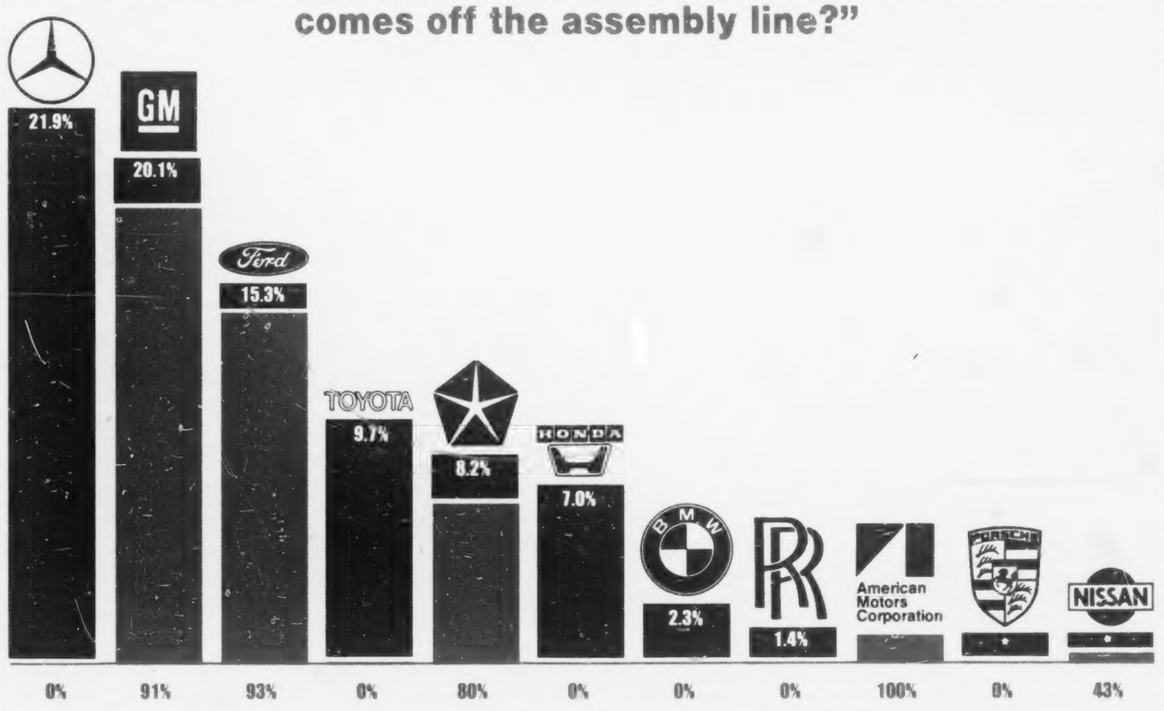
ONE OF THE ABC PUBLISHING COMPANIES

WHO BUILDS CARS BEST? WHO ELSE!

The people who build cars in North America doff their hats to the firstest with the mostest...again.

by Lance Ealey and Lindsay Brooke

"Which auto company builds the most defect-free car as it comes off the assembly line?"



▨ Company men: Red shading indicates how much of a company's total vote was cast by employees of that company.

For the second year running, the people who build cars in America said Mercedes-Benz builds the most defect-free cars as they roll off the assembly line. Mercedes received 21.9% of the vote, or 122 out of 557 responses to this year's survey. Last year M-B netted 26.8% of the vote (See Jan. '85, p. 32).

Typical reasons individuals gave for voting for M-B included this from a GM manufacturing supervisor: "The Mercedes is virtually defect-free. Paint is sharp; overall fit appearance is excellent; plant damage is minimal."

As happened last year, GM and Ford finished second and third, mostly on the strength of votes cast by their own employees (see "Company men" section of main chart).

If the "company men" bias is removed, the order becomes Mercedes-Benz first, Toyota second and Honda third. Our survey went to car manufacturing and production executives, managers, engineers and technicians in North America.

People Problems

This year, we asked those surveyed to list their number one quality problem. At GM and Ford, employees including absenteeism and training were seen as the major stumbling block to improved quality. As one GM industrial engineer put it, "Assembly operators making +$23.00/hr flat out don't do their jobs right! Their attitude of 'Let repair get it' is absolutely ridiculous."

On absenteeism, a Ford superintendent wrote, "Nobody performs the

GM's Twelve Biggest Quality Problems

GM employees answering the question "What is your biggest quality problem?" listed the following:

Employees[1]	19.2%
Suppliers/Vendors	16.6%
Management	11.4%
Paint	11.4%
Fit & Finish	9.6%
Engineering/Design	9.2%
Conformance To Spec	9.2%
Metal/Steel	5.7%
Electrical	2.2%
Equipment Maintenance	1.7%
Assembly	1.7%
Quanity vs. Quality	1.7%

[1]—includes absenteeism and training.
Total may not be 100% due to rounding.

Ford's Ten Biggest Quality Problems

Ford employees answering the question "What is your biggest quality problem?" listed the following:

Employees[1]	18.5%
Suppliers/Vendors	13.8%
Paint	13.8%
Fit & Finish	12.9%
Electrical	10.1%
Engineering/Design	7.4%
Metal/Steel	7.4%
Conformance To Spec	5.5%
Engine/Performance	5.5%
Equipment Maintenance	4.6%

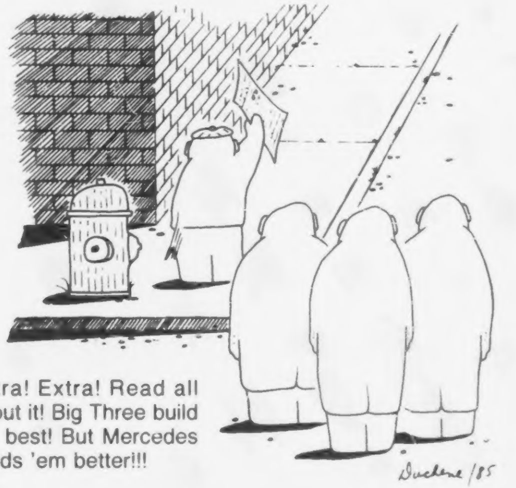
[1]—includes absenteeism and training.
Total may not be 100% due to rounding.

Chrysler's Seven Biggest Quality Problems

Chrysler employees answering the question "What is your biggest quality problem?" listed the following:

Vendors/Suppliers	32.6%
Fit & Finish	18.4%
Employees[1]	12.2%
Paint	12.2%
Conformance To Spec.	10.2%
Metal/Steel	10.2%
Engineering/Design	4.0%

[1]—includes absenteeism and training.
Total may not be 100% due to rounding.



Extra! Extra! Read all about it! Big Three build the best! But Mercedes builds 'em better!!!

job with the same finesse as the regular, trained operator."

Perhaps summing up the people problem best was this comment from a Ford plant engineer: "No matter how you design, execute and plan a product, it can only be as good as the people who are building it. Employee involvement is the most important quality tool that has ever been introduced in the auto industry. It significantly improves morale and provides a line of communication from the line worker to management."

At Chrysler, the least vertically in-

(Continued)

Mercedes-Benz Celebrates 100 Years

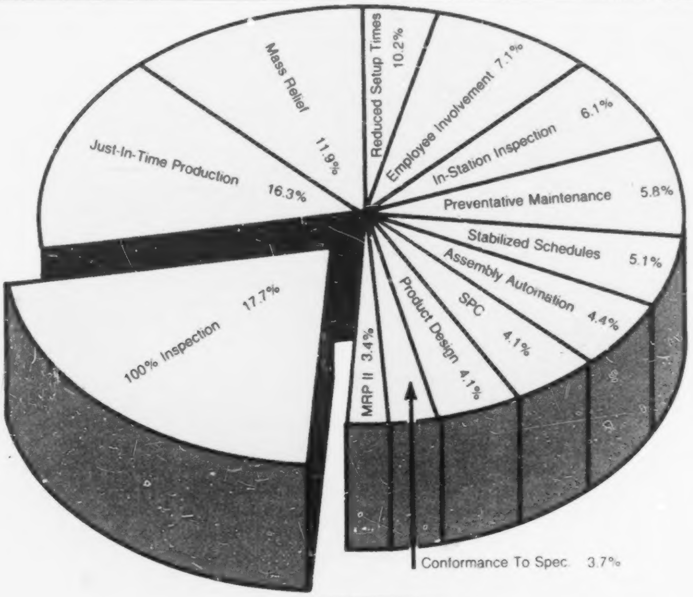
Daimler-Benz will celebrate the 100th anniversary of the patent of Carl Benz' motorwagen this January 29. The following comments are by Prof. Dr.-Ing. E.h. Werner Breitschwerdt, chairman of the Board of Management of Daimler-Benz A.G.

The special meaning that the centenary of the automobile has to us at Daimler-Benz goes beyond the length of our history and richness of our traditions. Rather, it comes from the goals of the two men who built the world's first automobiles, Gottlieb Daimler and Carl Benz, in their adherence to the highest possible engineering and quality standards.

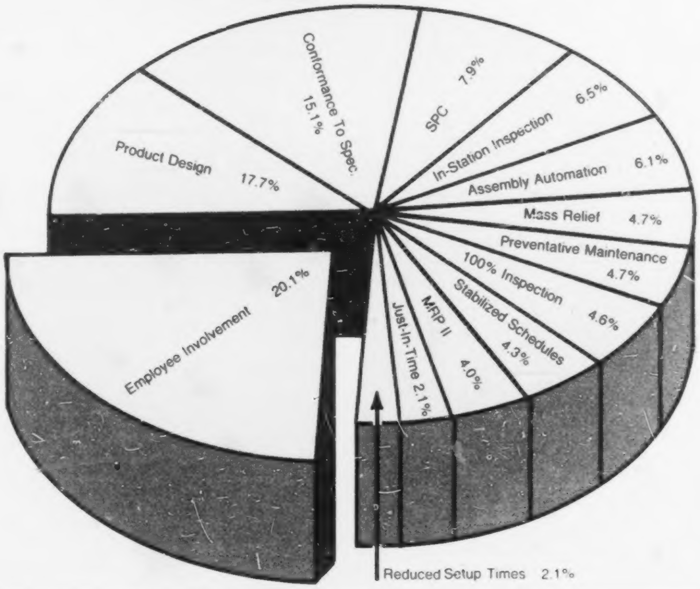
This striving for perfection by our founding fathers is still the guiding principle of our company, and will continue to be.

We are proud that this dedication has determined the good image and reputation of the Merecedes-Benz star and all the products carrying it worldwide. It also brings with it as a logical consequence—and as a sound basis for the progress of our company—the obligation to attain even higher standards in the next 100 years.

Which of the following has the LEAST impact on quality?



Which of the following has the MOST impact on quality?



tegrated of the Big Three with 70% of its parts and components outsourced, the top quality problem was with—you guessed it—vendors/suppliers.

Said one Chrysler operations manager: "Vendors do not see themselves as part of the team."

A Chrysler quality manager adds, "Components are bought on a lowest price basis: Quality suppliers are not always awarded component business due to price considerations, and thus quality is compromised."

Vendors/suppliers ranked second as a quality problem at both GM and Ford.

Upper Management Blasted

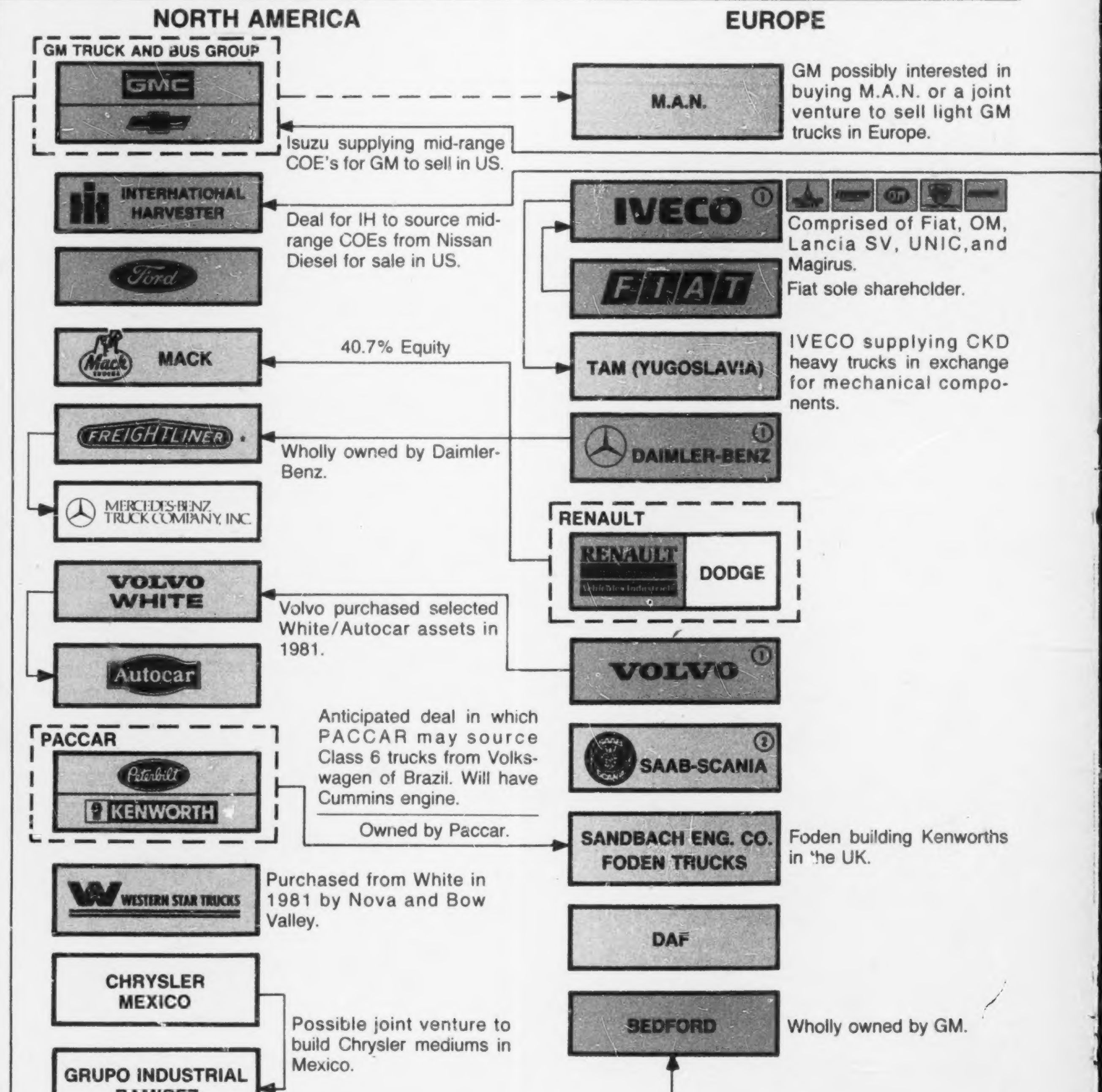
Upper management also got blasted as a source of quality problems. Penned one senior GM engineer, "They haven't changed their old way of operating—fear, fear, fear."

GM was also blasted for all of the loose strings left by the reorganization.

"During the reorganization, many responsibilities have been shifted," writes one GM general supervisor. "Some departments are overloaded due to jobs being shifted without appropriate manpower shifts, and some jobs have fallen through the cracks." The company, he writes, is "moving too fast without adequate planning." AI

MEDIUM AND HEAVY-DUTY TRUCK JOINT VENTURES AND MERGERS

A look at what's happening in the medium and heavy truck markets.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EUROPE
GM TRUCK AND BUS GROUP
GMC
M.A.N.
INTERNATIONAL HARVESTER
IVECO ①
Ford
FIAT
MACK
TAM (YUGOSLAVIA)
FREIGHTLINER *
DAIMLER-BENZ ①
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VOLVO WHITE
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VOLVO ①
PACCAR
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SANDBACH ENG. CO. FODEN TRUCKS
WESTERN STAR TRUCKS
DAF
CHRYSLER MEXICO
GRUPO INDUSTRIAL RAMIREZ
BEDFORD

GM possibly interested in buying M.A.N. or a joint venture to sell light GM trucks in Europe.

Isuzu supplying mid-range COE's for GM to sell in US.

Comprised of Fiat, OM, Lancia SV, UNIC, and Magirus.

Deal for IH to source mid-range COEs from Nissan Diesel for sale in US.

Fiat sole shareholder.

40.7% Equity

IVECO supplying CKD heavy trucks in exchange for mechanical components.

Wholly owned by Daimler-Benz.

Volvo purchased selected White/Autocar assets in 1981.

Anticipated deal in which PACCAR may source Class 6 trucks from Volkswagen of Brazil. Will have Cummins engine.

Owned by Paccar.

Foden building Kenworths in the UK.

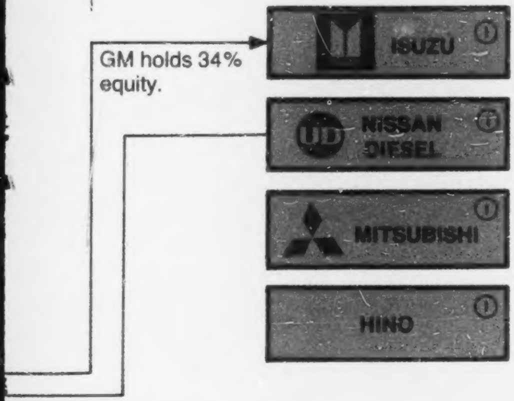
Purchased from White in 1981 by Nova and Bow Valley.

Possible joint venture to build Chrysler mediums in Mexico.

Wholly owned by GM.

* Freightliner is co-signer for Daimler-Benz in deal with FAMSA to produce heavy and medium trucks, chassis and engines in Mexico.

JAPAN



Key

▨ Heavy Truck Mfg.

□ Medium Truck Mfg.

▦ Heavy and Medium Truck Mfg.

① Exporting mediums to the US.

② Exporting Heavy Trucks to the US.

Many of the smaller concerns building medium and heavy trucks in third world countries are not listed here in order to reduce the chart's complexity. Since we will be updating this chart from time to time, any feedback from readers would be appreciated.

Main Heavy Truck Contenders on World Market
(Class 8—Units/Production)

	1983	TOTAL	1984	TOTAL	1985	TOTAL
Daimler-Benz	46,978	58,750	38,366	58,346	36,000	55,500
Freightliner	11,772		19,980		19,500	
Renault	16,952	31,145	15,724	44,798	17,000	44,000
Mack	14,193		29,074		27,000	
Volvo	23,395	28,516	23,865	33,764	28,000	38,500
White	5,121		9,899		10,500	
International Harvester		21,317		35,681		32,000
Kenworth	9,349	17,852	15,718	30,360	12,500	23,500
Peterbilt	8,503		14,642		11,000	
Saab-Scania		16,743		22,100		23,000
Hino		14,978		21,080		19,000
Mitsubishi		15,250		20,483		20,000
Nissan		15,718		19,062		15,000
Ford		9,070		18,845		21,000
Chevrolet	561	9,040	893	18,025	1,000	15,000
GMC	8,479		17,132		14,000	
Isuzu		15,488		17,360		15,000
Iveco		19,848		16,556		18,000
M.A.N.		11,329		11,154		14,000
TOTAL		285,044		367,614		353,500

1983-84 Source: PRS Consulting Group Inc.   1985: AI Estimate

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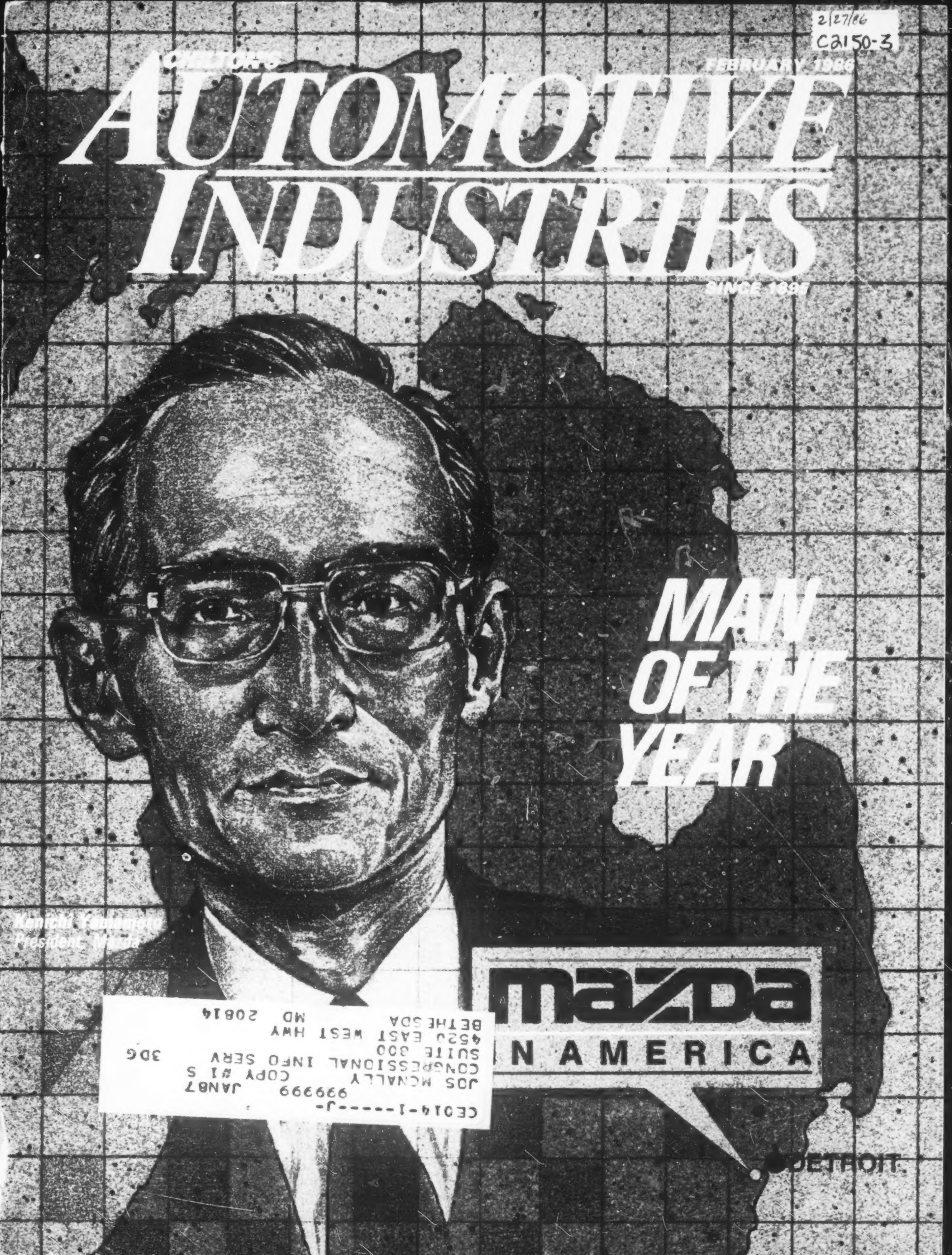

MAN OF THE YEAR

Kenichi Yamamoto
President, Mazda

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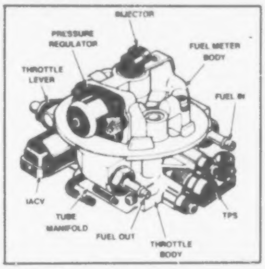
Mazda president Kenichi Yamamoto
Cover by Randy Hamblin.



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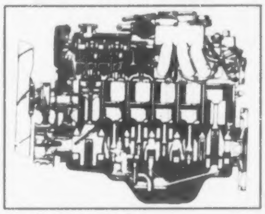

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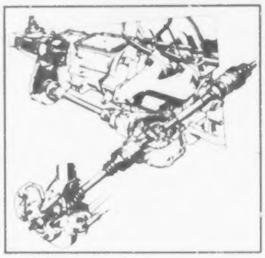

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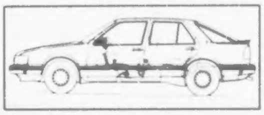

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Toyota Tops Vehicles Per Employee Ranking

by John McElroy

1985 PRODUCTIVITY RANKING BY AUTOMAKER

Company	Employment	Production	Vehicles/Employee
Toyota	61,665	3,535,495	57.3
Mitsubishi	23,000	1,096,156	47.6
Mazda	28,256	1,330,211	47.0
Nissan	58,925	2,473,191	41.8
Subaru	13,500	550,000	40.7
Honda	31,000	1,252,000	40.3
Ford	157,300	3,511,190	22.3
Chrysler	115,880	1,870,118	16.1
AMC	22,751	357,380	15.7
GM	544,500	7,296,155	13.3
Ford Europe	82,926	1,288,541	15.5*
Austin Rover Grp.	38,000	476,000	12.5
Peugeot	99,700	1,048,300	10.5*
Renault	157,696	1,649,766	10.4*
Fiat/Lancia	143,944	1,494,100	10.3*
GM Europe	127,600	1,300,000	10.1
VW/Audi	160,651	1,474,573	9.2
Citroen	60,700	551,700	9.0*
BMW	51,000	445,233	8.7*
Volvo	67,800	475,600	7.0
Saab	32,500	148,000	4.4
Daimler-Benz	199,000	751,929	3.7
Yugo	22,000	50,000	2.2

** = 1984 figures.*

An *AI* survey of 1985 production and employment shows that Toyota, Ford North American Operations and Ford Europe are the most efficient automakers in Japan, the United States and Europe, respectively. It also shows that despite the tremendous modernization and automation programs undertaken in North America and Europe over the last five years, there has been little, if any, gain on the Japanese.

The survey evaluates how many employees a car company needed to build the vehicles it produced last year. It includes salaried as well as hourly employees to reflect the efficiency of the total corporation.

What The Figures Mean

The numbers listed with each company measure how many cars were produced per employee. Yet, they've been adjusted to discount employees who are not involved in vehicle production, such as those with Ford's Aerospace division and GM's Hughes Electronics. The figures only represent each company's production and employment in Japan, North America and Europe and not on a worldwide basis.

The figures also include truck and bus production for those companies that produce them, which tends to lower their ranking since these vehicles are more labor intensive than automobiles. And there is no adjustment for the level of outsourcing at any company. This particularly penalizes GM, which produces 70% of its parts in house. Most Japanese companies produce 30% of their parts in-house. If outsourcing is factored into GM's figure, for example, it would be producing about 22 cars per employee.

Some of the European figures are based on 1984 production levels, which could tend to lower their productivity ranking.

Interestingly, companies in a given geographical area have levels of efficiency that are relatively the same. And though the survey is a simple one, it shows that the productivity differences between automakers in Japan, North America and Europe are strikingly different.

New Escort Will Get Low-cost British ABS

by Peter J. Mullins

A low-cost antilock braking system (ABS) supplied by Lucas Girling will be available as an option on European model Ford Escorts during the 1986 model year, *AI* has learned. It is believed that this is the first small car to be fitted with an ABS.

The Girling Stop Control Braking System (SCS), which is entirely hydraulic in operation and utilizes no electronics, was announced about a year ago and is specifically aimed at the small car market.

"Our aim is to bring sophisticated wheel lock control within the scope of the small-to-medium car manufacturer," notes a Girling spokesman. "Such cars are typically fitted with dual 'X-split' [diagonally-split] braking."

Girling points out that in Europe, the size and type of car for which this system is suited constitutes 60% of the total passenger car market.

Advantages claimed for SCS are that under normal or emergency braking the car retains directional stability on road surfaces which have differing adhesion levels, even when these differ from front to rear or left to right on the vehicle. Steering control is also retained, even when brak-

(Continued on p. 26)

Three US Cars Get "Gas Guzzler" Fine

by Joseph M. Callahan

1986 GAS GUZZLERS

Car	Mpg	Fine
Porsche 911	21.7	$ 500
Chrysler Fifth Avenue	21.6	$ 500
Dodge Diplomat	21.6	$ 500
Plymouth Gran Fury	21.6	$ 500
BMW 5 Series	21.2	$ 650
BMW 6 Series	21.2	$ 650
BMW 7 Series	19.7	$ 850
Jaguar XJ6	19.7	$ 850
Mercedes 560 SL	17.7	$1300
Ferrari Mondial Cabriolet	17.2	$1500
Ferrari 328 GTS	17.2	$1500
Maserati Biturbo Spyder	16.8	$1500
Maserati Biturbo	16.8	$1500
Maserati Biturbo 425	16.8	$1500
Jaguar XJ-S	16.7	$1500
Ferrari Testarossa	13.5	$2700
Lamborghini Countach	8.8	$3850

For the first time, three domestic cars have been slapped with "gas guzzler" labels by the Environmental Protection Agency (EPA). All three are Chrysler M-body cars—the Dodge Diplomat, Chrysler 5th Avenue and Plymouth Gran Fury. The EPA also imposed the label on 17 foreign cars.

Buyers of "gas guzzlers" must pay a tax of $500 to $3850 per car at time of purchase.

It should be pointed out, however, that not every model of these 20 cars will be subjected to the fines—only those models that fail to get a minimum of 22.5 mpg (*10.4 L/100 km*). Unless the law is changed, 22.5 mpg will be the "gas guzzler" figure from now on.

Quite a number of other cars sold in the US with mileage under 22.5 mpg are exempt from the tax, either because they are marketed as emergency vehicles or because they weigh over 6000 lb (*2721.6 kg*). All four Rolls Royce models and some GM station wagons, for example, are exempt for the latter reason.

Quite a few 1986 cars would be "gas guzzlers" if one only considered the Department of Energy's 1986 Gas Mileage Guide. The highway and city mileages of these new models would seem to put them in the gas-guzzler class, but in actuality do not.

Robert Maxwell, director of EPA's Certification Division in Ann Arbor, MI straightened out this apparent contradiction, saying the Government calculates two figures for each car. The mileage used to identify "gas guzzlers" is calculated in the EPA's Certification Laboratories under ideal and uniform conditions.

The other mileage figure, which is published in the Mileage Guide and is printed on each new car's window, reflects what a wide variety of drivers

(Continued on p. 35)

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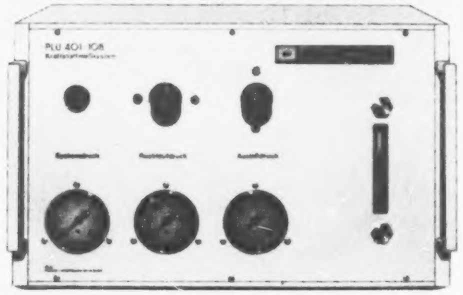

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MODEL	TYPICAL ACCURACY	FLOW RATE	MEASURING TIME	CONFIDENCE LEVEL
PLU-103A	±0.25%	10 ml/min	3 sec.	95%
PLU-116H	±0.5%	100 ml/min	15 sec.	95%
PLU-401/108	±1%	500 ml/min	10 sec.	99+%

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(Continued from p. 33)

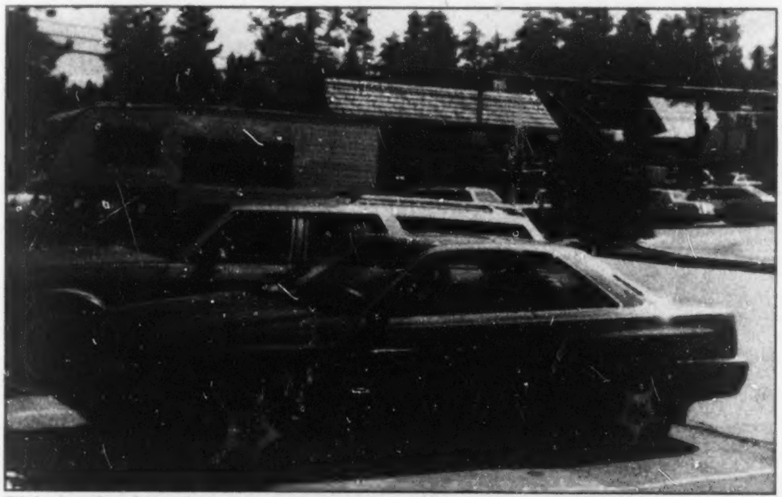
might get driving under different conditions.

This is based on 90% of the city figure and 78% of the highway figure which the EPA lab calculates. That's why some low mileage cars, including Corvette, Cadillac and Lincoln, are not counted as "guzzlers."

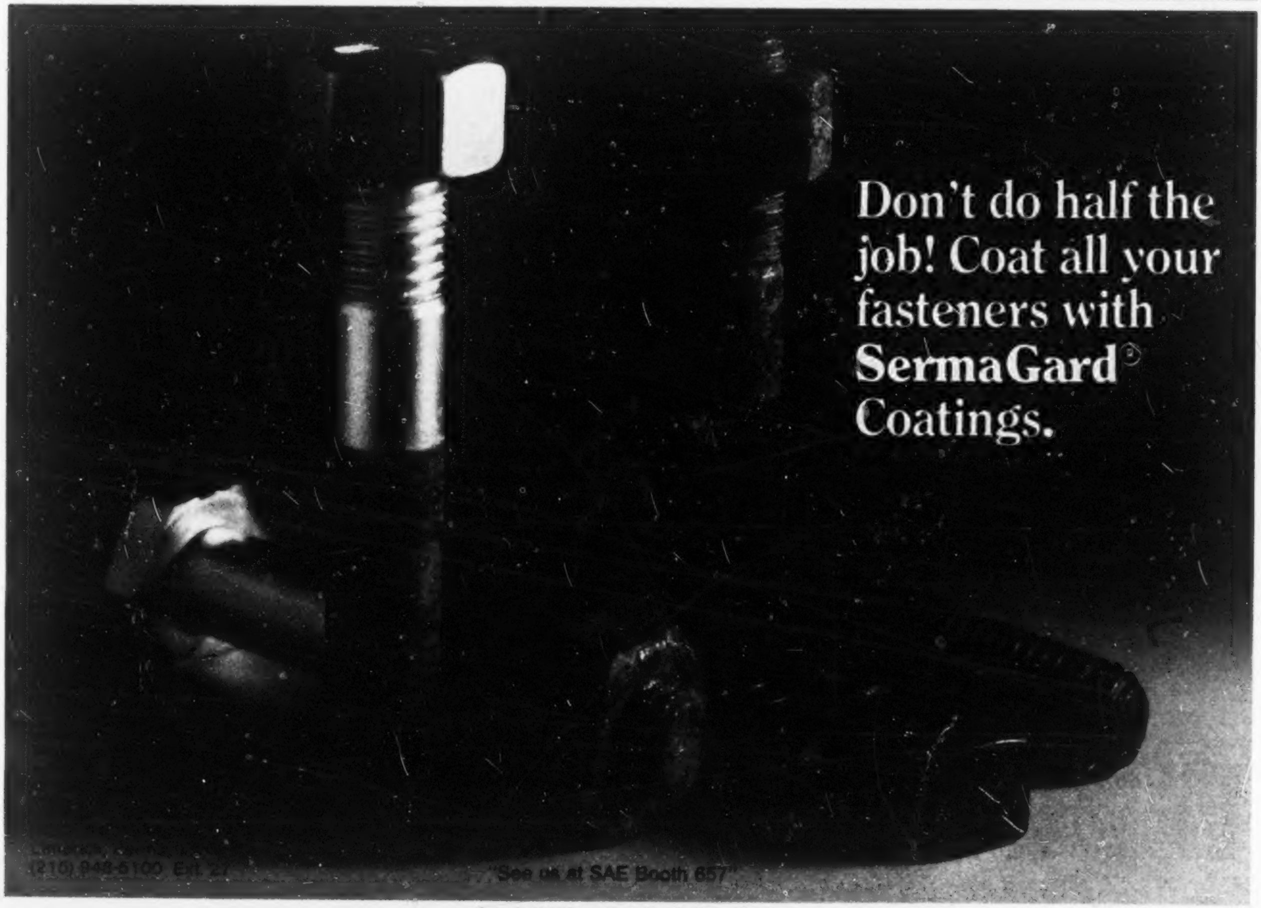
And while the "gas guzzler" designation is based on the performance of each model (depending on weight, powertrain, etc) of each line of cars, the Corporate Average Fuel Economy (CAFE) is based on a company's entire fleet of cars after they're sales-weighted at the end of the year.

As a result, even though General Motors and Ford Motor Co. are still subject to corporate fines because they've failed to meet the CAFE numbers, they have no 1986 "gas guzzlers." Chrysler's M-cars are guzzlers, in spite of a fleet average which is well over the 1986 mandated CAFE mileage figure of 26 mpg. AI

Musda? 626? Maztang?



This badgeless two-door coupe is either a future Mazda or the new Mazda-built Mustang, which Ford is hoping to source from Mazda's forthcoming Flat Rock, MI assembly plant. Under the mystery car's bulged fenders are a turbocharged four-cylinder engine and antilock brakes. Could this be the future Flash from Flat Rock, or simply a new-generation 626 coupe?



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ANALYST SURVEY '86

We ask the nation's top auto analysts to take their best shots at what 1986 will bring.

by Mary Ann Angeli

This year will see 14.8 million passenger car and light truck sales in the United States, according to *AI*'s annual survey of automotive analysts. The figure breaks down to 10.6 million car sales and 4.2 million light trucks.

Passenger car production should run about 7.8 million units, with light truck production coming in at 3.3 million for a total of 11.1 million units.

George Peterson at J. D. Power & Associates, which forecast a high 11.3 million passenger car and 4.6 million light truck sales for '86, commented, "The overall economy will continue to be strong throughout the 1986 calendar year. Interest rates and inflation will remain relatively stable at low rates. Unemployment will also remain stable. Per capita income will slowly increase, so the underpinnings look good for continued strong vehicle sales."

Peterson added that the loosening of the VRA has "forced the market back into a much more competitive mode. As the Japanese volume increases, their artificially high transaction prices experienced over the last few year are expected to drop away.

"As these cars become more affordable, the domestic manufacturers must respond with reductions in the transaction prices of their car through interest rate incentives, longer warranties, discount option packages or rebates. This competition will bring buyers back into the new vehicle market."

Adds William Pochiluk of Autofacts, "It is expected that Japanese imports will be increasingly restrained by political pressures. This will intensify as the market softens. We project a richening mix of imports."

Who Says How Many

(Units/Millions)

Sales figures are for both US and imported cars and trucks, production figures unless otherwise noted are US domestic.

	Passenger Cars		Light Trucks	
Company	Sales	Production	Sales	Production
American Motors Corp.	10.3	NA	4.2	NA
AP Parts Co.	10.4	7.2	3.9	2.8
Arthur D. Little Inc. Automotive Unit	10.5	7.3	4.0	3.3
AutoFacts Inc.	10.2	7.2	4.3	3.1
Automotive Information Council	10.4	7.5	3.9	3.2
Chase Econometrics	10.5	NA	4.3	NA
Chrysler Corp.	10.5	NA	4.4	NA
Ford Motor Co.	10.4	7.4	4.2	3.0
General Motors Corp.	10.5	NA	4.5	NA
Integrated Automotive Resources Inc.	10.5	8.8*	4.2	4.4*
J. D. Power & Associates.	11.3	7.9	4.6	3.8
Manufacturers Hanover Trust Co.	10.4	7.5	NA	NA
Paine Webber	11.4	8.1	4.2	3.1
Research Bernstein	12.4	9.1	4.1	3.3
Average	**10.6**	**7.8**	**4.2**	**3.3**

**North American only*

AUTOMAKER QUARTERLY REPORT

Our first report offers production and sales results through December '85 including an overview of financial happenings among the carmakers.

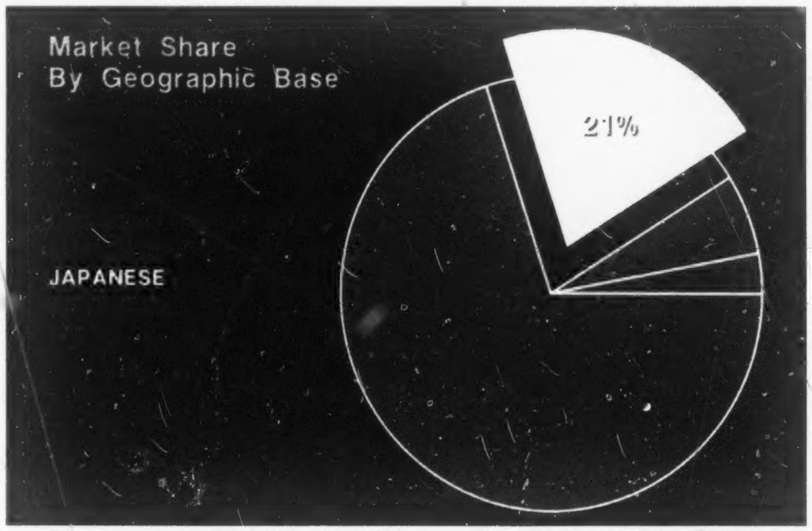
Domestic Auto Sales

Carline	'85	'84	% Change
Cavalier	431,031	377,545	14.2%
Escort	420,690	353,578	19.0%
Celebrity	363,619	322,189	12.9%
Ciera	333,585	242,209	37.7%
Tempo	281,144	256,532	9.6%
Accord*	268,420	256,650	4.6%
Chevrolet	245,826	258,902	-5.1%
Century	234,508	217,042	8.0%
Sentra*	219,024	---	---
Supreme	217,504	302,087	-28.0%
Camaro	199,985	202,172	-1.1%
Olds 88	188,129	258,293	-27.2%

* Includes imports

'85 Domestic Light Truck Production

Truckline	2nd Qrt.	3rd Qrt.	4th Qrt.
Chrysler/Vans	35,939	19,864	29,260
Sport Util.	7,538	5,773	5,757
Miniwagon	74,958	58,348	17,680
Lt. Convtl.	120,733	104,048	49,403
Ford/Aerostar	1,808	15,134	32,317
Bronco	13,791	11,879	13,257
Econoline	64,757	41,104	61,523
Ranger	72,221	51,959	58,287
Bronco II	28,097	22,899	30,660
Lt. Convtl.	173,508	133,945	140,952
Chevy/Blazer	11,531	10,136	12,025
Suburban	18,059	16,387	12,271
P-Model	12,977	7,034	8,649
S-10	60,469	60,833	49,287
Blazer S	53,744	53,298	46,090
Astro	35,926	31,609	33,845
Van	49,667	34,026	48,987
Lt. Convtl.	120,733	104,048	106,056
GMC/Jimmy	3,045	2,577	3,093
Suburban	6,452	6,457	4,746
P-Model	2,104	1,368	847
S-15	16,378	15,797	12,568
Jimmy S	14,593	13,875	5,596
Safari	9,576	8,259	8,284
Van	15,109	9,951	12,599
Lt. Convtl.	42,520	36,269	35,411
Nissan Pickup	22,386	28,103	29,908



Passenger Car Market Share By Geographic Base

Manufacturers	Total Sales	Total Market Share
American	7,830,535	69.90%
Japanese	2,381,900	21.26%
European	617,516	5.51%
US Built Imports (VWoA, Honda, Nissan, Renault)	371,142	3.31%
Total	11,201,093	99.98%

Passenger Car Market Shares To Date

Manufacturer	Sales	% Total
General Motors	4,692,318	45.65%
Ford	2,079,456	20.23%
Chrysler	1,245,149	12.11%
Toyota	614,576	5.98%
Nissan	572,847	5.57%
Honda	552,389	5.37%
VW	214,770	2.09%
Subaru	178,175	1.73%
AMC/Renault	130,284	1.27%

Information compiled by Integrated Automotive Resources Inc., Wayne, PA.

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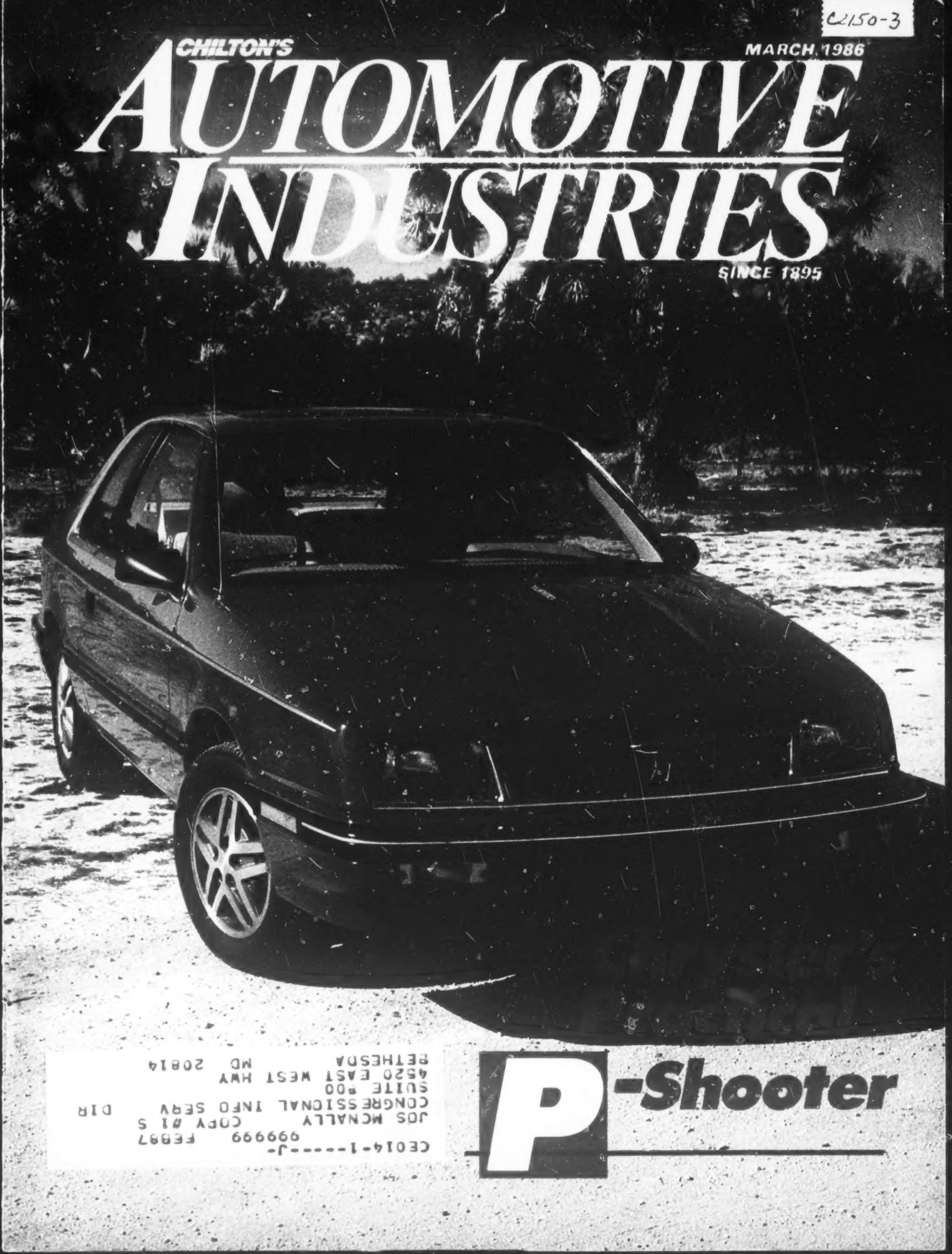

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Up close with the new Plymouth Sundance and Dodge Shadow, Chrysler's niched econoclasts.

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Chevy's imported econotwins take the brass ring for the second year running.

34 DETROIT DIESEL AUTOMATES THE AUTOMATIC TRANNY
Detroit Diesel Allison sets up a "skunk works" to rewrite the book on producing transmissions automatically.

38 FAST-TRACKING WITH HONDA'S US MANUFACTURING CHIEF
The president of Honda of America Manufacturing details the Marysville expansion, talks US carmaking and predicts the future in engine design.

43 MITI: CAGING JAPAN'S AUTOMOTIVE TIGERS
MITI's role in dealing with the virile Japanese auto industry at times seems closer to lion tamer than negotiator.

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Chrysler's P-Cars. Dodge Shadow above.
Cover: Plymouth Sundance.

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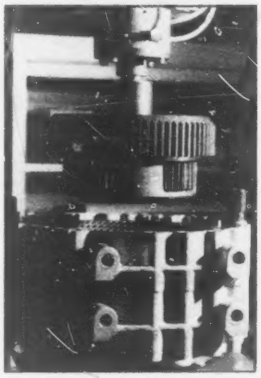

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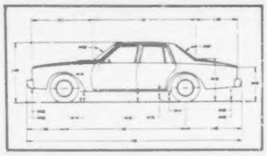

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1986 TOTAL CAR COEFFICIENT

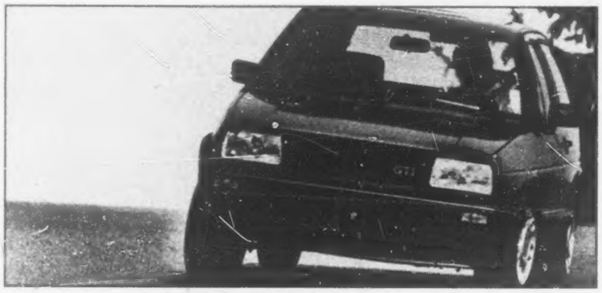
Chevy's imported econotwins take the brass ring for the second year running.

by Lance Ealey

Econoboxes

.43	**Chevy (Suzuki) Sprint, 5-spd man., 4-dr.**
.39	Chevy (Isuzu) Spectrum, 5-spd man., H-back
.38	Subaru hatchback base
.36	Yugo GV* 4-spd man.
.34	Isuzu I-Mark, 5-spd man. H-back
.33	Mazda 323, 5-spd man., 4-door
.32	Dodge Omni, 1.6-Liter, 4-spd man.
.32	VW Golf, 1.8-L, 5-spd man.
.31	Ford Escort 1.9-L, 5-spd man.
.30	Nissan Sentra, 1.5-L, 5-spd. man., 4-door
.29	VW Golf diesel, 5-spd man.
.29	Encore GS 1.7-L, 5-spd man.
.28	Honda Civic, 1.5-L, 5-spd man., 2-door
.28	Toyota Tercel, 4-spd man.
.27	Hyundai Excel, 5-spd man.
.25	Chevy Nova, 5-spd man., hatchback
.23	Chevy Cavalier, 2.0-L, 5-spd man.
.22	Ford Escort, 1.9-L, A/T
.17	**Chevy Chevette, 1.6-gas, A/T**

**—Estimated Interior Volume*



Econoblasters

.27	**Golf GTI, 5-spd man.**
.26	Dodge Omni GLH Turbo, 5-spd. man.
.26	Mercury Lynx XR3, HO 1.9-L, 5-spd man.
.25	Mitsubishi Mirage Turbo, 5-spd. man.
.24	Ford Escort GT 2-door hatchback, 5-spd. man.
.23	Jetta GLI, 5-spd man.
.22	Pontiac Sunbird S/E Turbo Coupe, 4-spd man.
.19	**Chevy Cavalier Z24 Coupe, 4-spd man.**
.19	**Mitsubishi Tredia turbo, 5-spd. man.**

Small Mid-Segment Family Cars

.25	**VW Jetta, 1.8-L, 5-spd man. 4-door**
.25	**Mazda 626 Coupe, 5-spd**
.20	Dodge Aries, 2.5-L, A/T, 4-door
.18	Mercury Topaz, 2.3-L, A/T, 4-door
.16	Olds Calais, 3.0-L V6, A/T, 2-door
.16	Nissan Stanza Wagon, 2.0-L, 5-spd man.
.14	Pontiac Grand AM SE, 3.0-L V6, 3-spd A/T, 4-door
.13	VW Quantum, 5-spd man.
.12	Nissan Maxima SE, 3.0-L V6, 5-spd man., 4-door
.10	**Toyota Cressida, 2.8-L, 5-spd man., 4-door**

Large Mid-Segment Family Cars

.17	**Chevy Caprice Classic, 4.3-L V6, 3-spd A/T, 4-door**
.15	Buick LeSabre Custom coupe, 3.8-L V6, 4-spd A/T
.15	Chevy Caprice Classic, 5.0-L V8, 4-spd. A/T, 4-door
.15	Ford Taurus GL, 3.0-L V6, 4-spd A/T, 4-door
.14	Olds Delta 88, 3.8-L V6, 4-spd A/T, 2-door
.13	Mercury Sable LS, 3.0-L V6, 4-spd A/T
.11	**Ford Crown Victoria, 5.0-L V8, 4-spd A/T**

Mid-Segment Sports/Sporty Cars

.21	**Dodge Lancer, 2.2-L turbo, 3-spd A/T**
.21	**Ford Mustang GT, 5-spd man.**
.20	Honda Prelude 2.0Si, 5-spd man.
.20	Mazda 626 GT Turbo Coupe, 5-spd. man.
.18	Chrysler LeBaron GTS, 2.2-L turbo, 3-spd A/T
.18	Buick Grand National, 3.8-L turbo V6, 4-spd A/T
.18	Toyota Celica GT-S, 5-spd man.
.17	VW Scirocco, 5-spd man.
.17	Honda Accord LXi sedan, 5-spd man.
.16	Chevy IROC-Z Camaro
.15	Buick Century T-Type, 3.8-V6, 4-spd A/T, 4-door
.14	Subaru XT Coupe Turbo, fwd, 5-spd man.
.14	VW Cabriolet, 5-spd man.
.13	Isuzu Impulse Turbo, 5-spd man.
.13	Buick Somerset T-Type, 3.0-L V6, 3-spd. A/T, 2-door
.11	**Cadillac Cimarron, 2.8-L V6, A/T**

Upper Segment Sports/Luxury Cars

.13	**Saab 9000, 5-spd man.**
.11	Volvo 740 Turbo station wagon, 5-spd.
.10	Mitsubishi Starion ESI-R, 5-spd man.
.10	Pontiac 6000 STE
.10	Saab 900S, 5-spd man., H-back
.09	Mazda RX-7 GXL, 5-spd man.
.09	Olds Toronado, 3.8-L V6, 4-spd. A/T
.09	Lincoln Mark VII LSC
.08	Audi 4000CS Quattro
.08	Cadillac DeVille
.08	BMW 325e, 5-spd. man. 4-door
.08	Buick Riviera T-Type
.07	Audi 5000CS Turbo Quattro
.07	BMW 524td
.06	Mercedes-Benz 190E 2.3-16, 5-spd man.
.06	300E Mercedes-Benz, 4-spd. A/T
.06	BMW 528e, 5-spd man.
.06	BMW 535i, 5-spd man.
.06	Lincoln Continental
.05	Cadillac Eldorado, 4.1-L V8, 4-spd A/T
.04	BMW 735i, 5-spd man.
.04	BMW 635CSi, 5-spd man.
.03	**Porsche 911 Turbo**
.03	**Jaguar XJ-6 Vanden Plas, 4.2-L, A/T**

Welcome To New Math

The Total Car Coefficient (don't send letters, I know it's not really a coefficient) is an index that distills four basic attributes of a car into one number. A car's roominess, EPA city mpg, acceleration speed and FOB or POE retail price are plugged into the following formula:

$$\frac{\textbf{Interior Vol. (ft}^3\textbf{) x EPA City mpg}}{\textbf{0-60 mph Time x Retail Price}} \times 10 = \textbf{TCC}$$

The formula takes into account the positive value of roominess and fuel economy and the inverse value of 0-60 mph time and retail price. In other words, you want big numbers in roominess and fuel efficiency and little numbers in speed and price. We multiply by 10 simply to remove an empty decimal place.

Most people would argue that price plays the predominant role in the TCC. In defense we offer the Yugo, which costs a cool $1300 less than our winner and $2600 less than the second place Spectrum, yet the Yugo came in fourth. Both the Sprint and the Spectrum clearly benefited from their high fuel mileage numbers and quickness compared to the Yugo.

Chevy's Chevette lands at the bottom because with automatic transmission it went from 0-60 mph in 20 seconds. Additionally, its 25 mpg city fuel mileage isn't even in the running for an econobox anymore.

The Golf GTI won a hard-fought battle in the Econoblaster division, due to its good overall balance in all four areas. The Dodge Lancer Turbo and Ford Mustang beat out some world class competition in the Mid-Segment Sports/Sporty Car division, and Chevy's venerable V6 Caprice ended up on top in Mid-Segment Large Cars.

Saab's 9000 ran away with the Upper-Segment Sports/Sporty Car division mainly because of its bristling speed and cavernous interior regions.—*L.A.E.*

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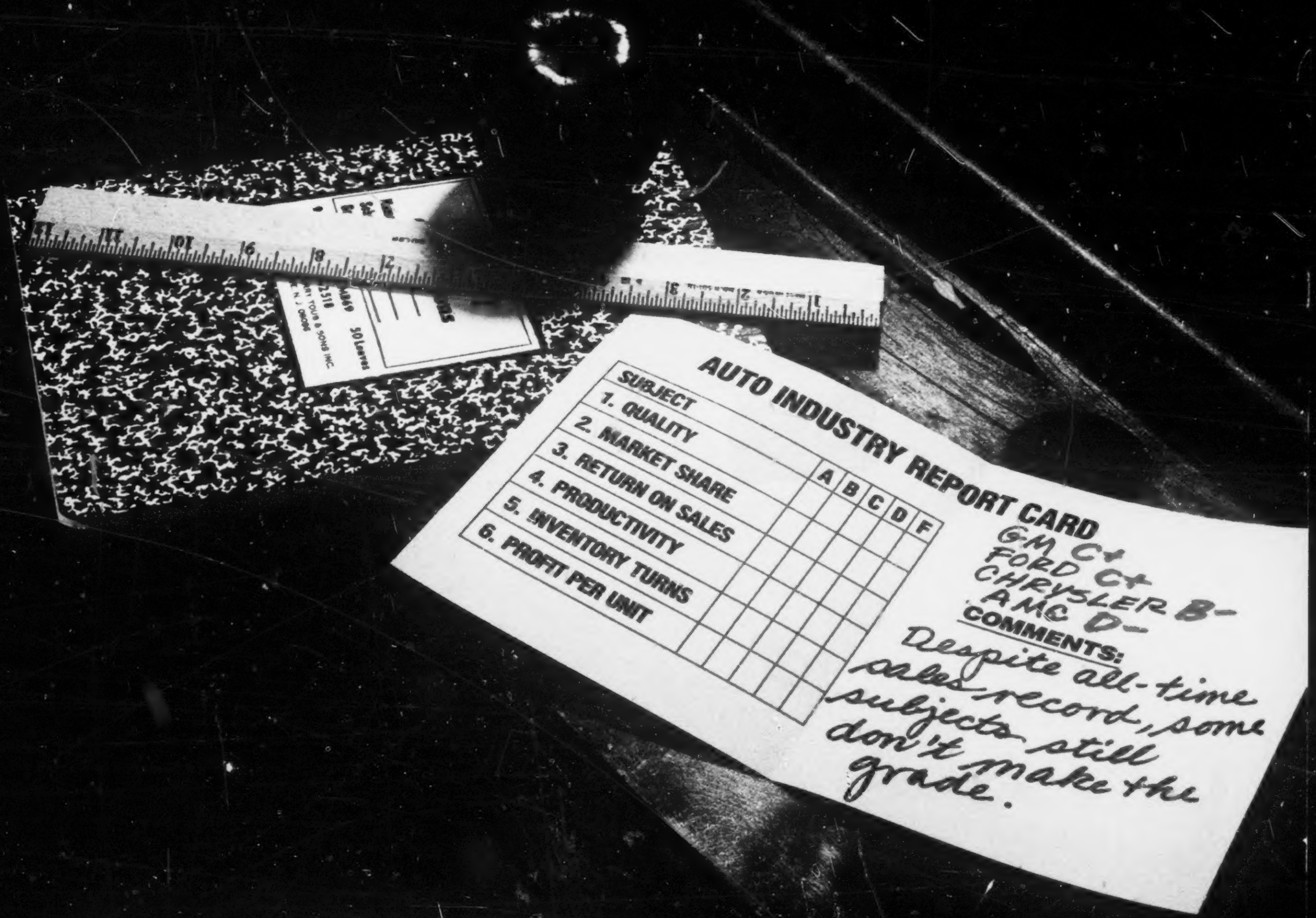
AUTO INDUSTRY REPORT CARD
SUBJECT
1. QUALITY
2. MARKET SHARE
3. RETURN ON SALES
4. PRODUCTIVITY
5. INVENTORY TURNS
6. PROFIT PER UNIT
A
B
C
D
F
GM C+
FORD C+
CHRYSLER B-
AMC D-
COMMENTS:
Despite all-time sales record, some subjects still don't make the grade.

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AUTOMOTIVE INDUSTRIES
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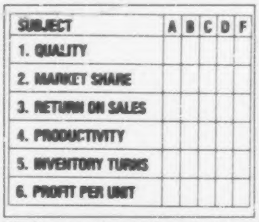
38 AUTO INDUSTRY REPORT CARD: PROBLEMS IN PROFIT-LAND
Class distinctions among the Big Four become even more pronounced as Chrysler heads for the top and AMC scraps bottom.



SUBJECT	A	B	C	D	F
1. QUALITY					
2. MARKET SHARE					
3. RETURN ON SALES					
4. PRODUCTIVITY					
5. INVENTORY TURNS					
6. PROFIT PER UNIT					

Who's scoring how high in which area? Find out on page 38.

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The 'We Make It Simple' folks step up to bat in autodom's luxury/sport ballgame with a new division—and two new, yet familiar automobiles.

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GM gets tough on gearbox quality in an effort to halt its automatic transmission builder's tranny troubles.

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TRW wins the race to front the first electronic power steering system.

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We talk with the president of Hughes Electronics about potential technology transfers, and how GM could help solve quality problems.

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The one-two punch of lower gas prices and weak dollars could mean blue skies for domestic automakers in their battle with the Japanese.

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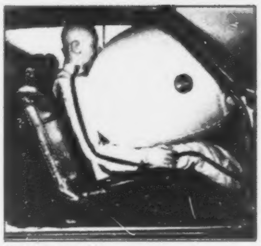

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ONE OF THE ABC PUBLISHING COMPANIES

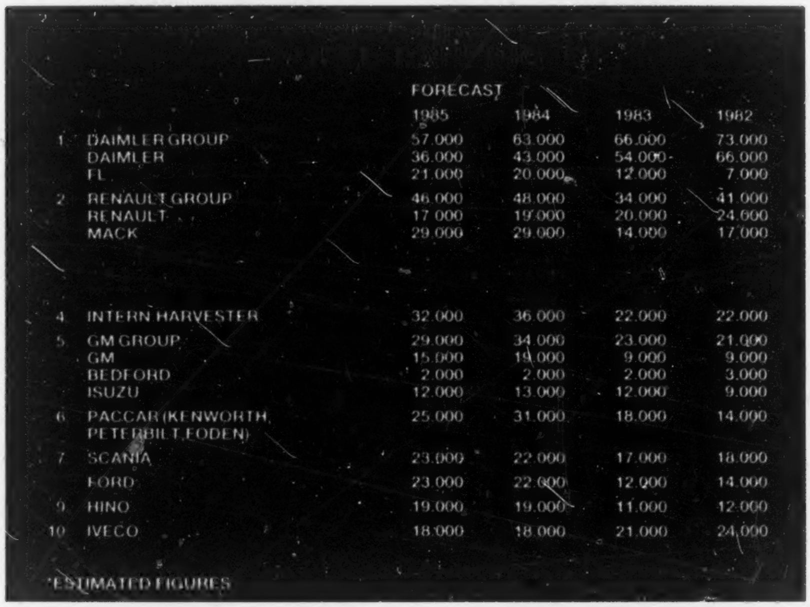
Volvo White Beats GMC In Class 8 Market Share

by Douglas Williams

"We like to say 1985 was the year we passed General Motors," says Thage Berggren, president of Volvo White Truck Corp. When Volvo bought the assets of White in 1981, the truck company had just 4.9% of the US Class 8 market. In 1985, Volvo White took 8.8% of the US market, edging just ahead of GMC and just behind Kenworth and Peterbilt for the year. In that same four-year period, GMC slipped from 13.2% share of market to 8.7%.

Berggren said the US subsidiary of the Swedish manufacturer is proud that it's the only Class 8 (over 33,000 lb GVW; *15,000 kg*) manufacturer in the US that consistently increased market share over the past four years.

In detail, Volvo White's performance looks even better. "During the second half of 1985, Volvo White retail delivered trucks at a rate that was quite opposite the declining industry," said Berggren. "We averaged 10% Class 8 market share for the months July through December.



		FORECAST 1985	1984	1983	1982
1	DAIMLER GROUP	57.000	63.000	66.000	73.000
	DAIMLER	36.000	43.000	54.000	66.000
	FL	21.000	20.000	12.000	7.000
2	RENAULT GROUP	46.000	48.000	34.000	41.000
	RENAULT	17.000	19.000	20.000	24.000
	MACK	29.000	29.000	14.000	17.000
4	INTERN HARVESTER	32.000	36.000	22.000	22.000
5	GM GROUP	29.000	34.000	23.000	21.000
	GM	15.000	19.000	9.000	9.000
	BEDFORD	2.000	2.000	2.000	3.000
	ISUZU	12.000	13.000	12.000	9.000
6	PACCAR (KENWORTH, PETERBILT, FODEN)	25.000	31.000	18.000	14.000
7	SCANIA	23.000	22.000	17.000	18.000
	FORD	23.000	22.000	12.000	14.000
9	HINO	19.000	19.000	11.000	12.000
10	IVECO	18.000	18.000	21.000	24.000

*ESTIMATED FIGURES

US Sales Best

"Our people at New River Valley, VA are pushing out 38 trucks a day, today," he continued. "That's the highest single shift production rate since the plant came into existence." The previous high output for one year was 8100 big trucks in 1978; in 1985 output was 8700, Berggren says.

By mid-1985, Volvo White's cumulative profit equalled the monies that were invested in the company since buying White, he adds. The US is "Volvo's largest and most successful truck market," he says. It accounts for 32% of all Volvo truck sales around the world (see chart for Class 8 world rankings).

Larry Oliphant, sales VP, said the company has sold "a little over 500 Volvo N12 trucks [typically straight-jobs with dual rear tandem drive axles] into the construction business."

The company is just introducing a new gear-driven flywheel power take-off for the N12 trucks. It's aimed specifically at concrete mixers, refuse trucks and the like. Mounted between the engine and transmission, with the hydraulic pump behind the truck cab, the new PTO unit has a separate clutch controlled by a switch on the instrument panel.

Volvo now has some 900 of its 12-L diesel-powered trucks in the US, and claims fuel economy to be in excess of 10% better than the competition. AI

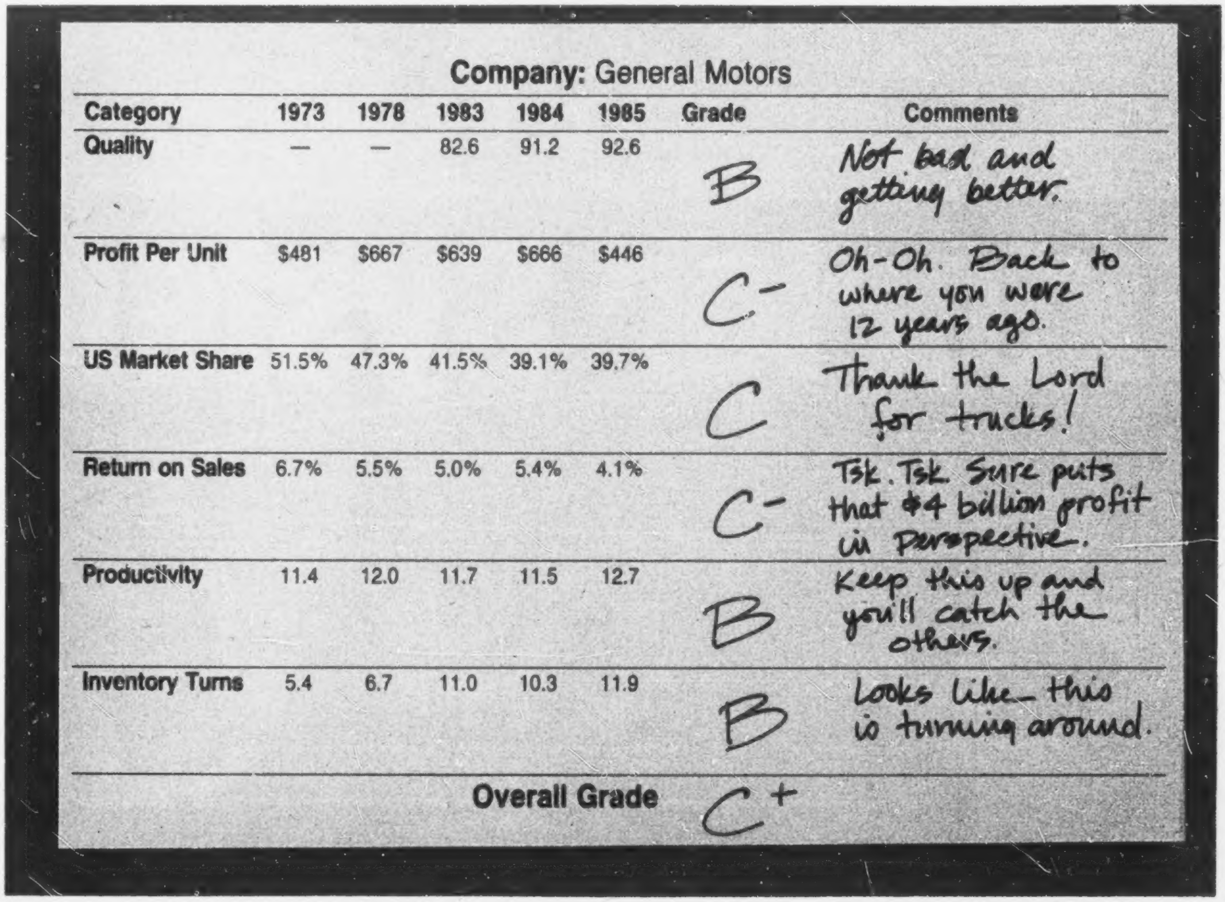
'87 Nissans Become Jaunty Jalopies

Nissan restyles its Sentra and Stanza models for 1987. Sentra models (two-door SE sport coupe shown left) feature a standard fuel-injected (TBI) 1.6-L four. Also in the '87 Sentra family are a new three-door hatchback, two-and four-door notchbacks and a five-door wagon. Nissan is shooting for 12% of the US small sedan market with the new Sentra range, or about 220,000 units/yr. The Stanza (right, notchback GXE) for '87 shares the Maxima's suspension and longer platform but not it's 3.0-L V6. Power instead comes from the 97 hp 2.0-L four found in last year's model.

PROBLEMS IN PROFIT LAND

Despite record '85 sales, quality and performance gains remain marginal.

by John McElroy



Company: General Motors

Category	1973	1978	1983	1984	1985	Grade	Comments
Quality	—	—	82.6	91.2	92.6	B	Not bad and getting better.
Profit Per Unit	$481	$667	$639	$666	$446	C-	Oh-Oh. Back to where you were 12 years ago.
US Market Share	51.5%	47.3%	41.5%	39.1%	39.7%	C	Thank the Lord for trucks!
Return on Sales	6.7%	5.5%	5.0%	5.4%	4.1%	C-	Tsk. Tsk. Sure puts that $4 billion profit in perspective.
Productivity	11.4	12.0	11.7	11.5	12.7	B	Keep this up and you'll catch the others.
Inventory Turns	5.4	6.7	11.0	10.3	11.9	B	Looks like this is turning around.
					Overall Grade	C+	

By most appearances, 1985 was a banner year for the American auto industry. Though the domestic automakers' didn't make as much money as they did in 1984, combined profits at GM, Ford and Chrysler still came to a staggering $8 billion. And total industry sales set an all time record.

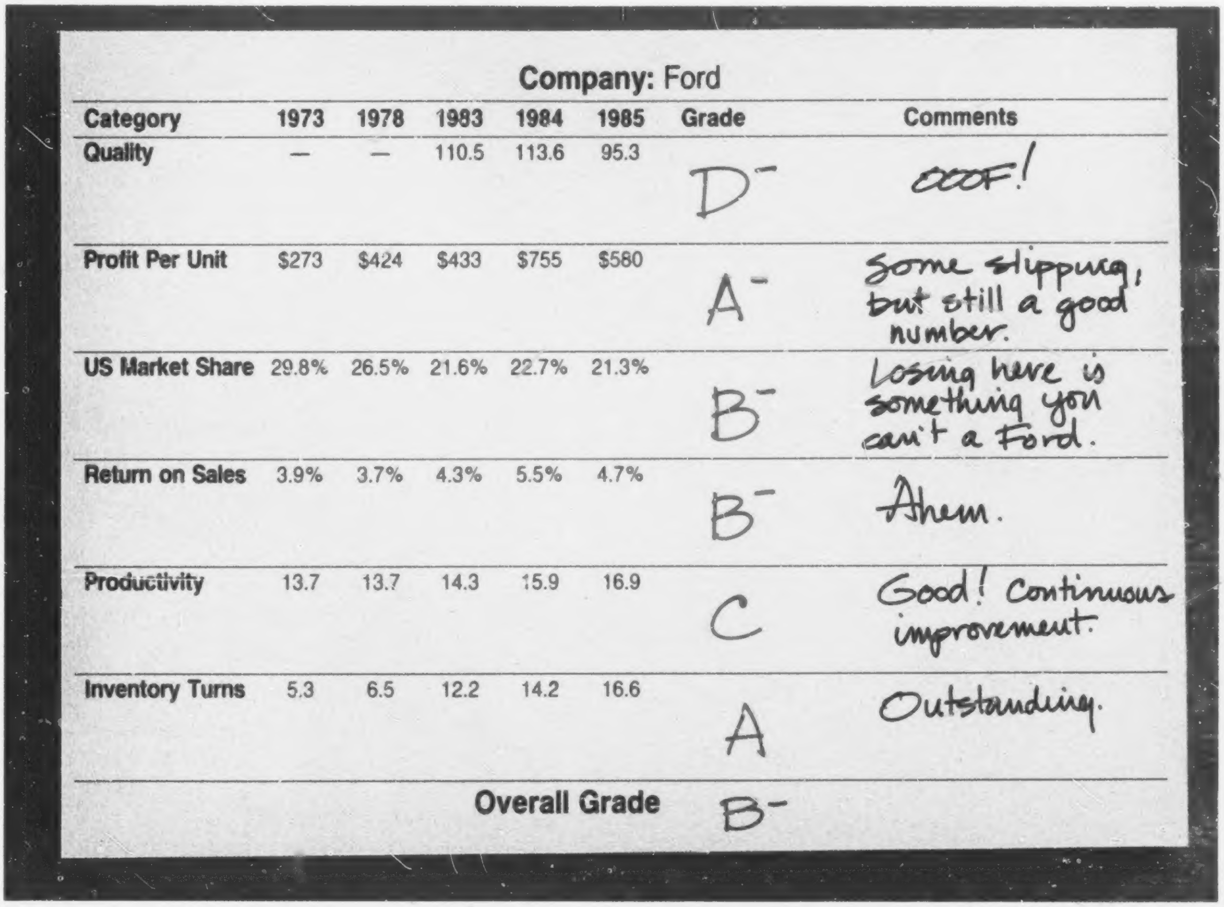
But if we use ***AI***'s Annual Report Card to peek behind these headlines, it becomes apparent that problems still persist. Strikes, low cost financing, heavy overtime schedules and import competition all took their toll. Nonetheless, compared to last year, the industry has made marginal improvements.

To determine each company's grade, we didn't just look at who got the highest numbers in each category. Instead, we looked at the trends in six categories. Each company was marked according to its own performance, not how it stacked up against its competitors. So even if a company scored higher than all the others in a given category, it didn't automatically get a better grade. However, if you don't agree with the grades we gave, the numbers are there for you to grade them yourself.

Our quality measure is based on the J.D. Power Customer Satisfaction Index, which rates cars after they've been in customers' hands for a year. And it was a shock to learn that Ford's and Chrysler's quality ratings fell into a steep power dive. Why the downfall? Probably for several reasons, but mostly because both companies have been running so much overtime for the last two years. They're simply wearing out their people and equipment.

Then too, part of the old "get it out the door" manufacturing philosophy seems to have crept back as all companies struggled to gain or maintain market share.

Though it still has the best overall



Company: Ford

Category	1973	1978	1983	1984	1985	Grade	Comments
Quality	—	—	110.5	113.6	95.3	D-	ooof!
Profit Per Unit	$273	$424	$433	$755	$580	A-	Some slipping, but still a good number.
US Market Share	29.8%	26.5%	21.6%	22.7%	21.3%	B-	Losing here is something you can't a Ford.
Return on Sales	3.9%	3.7%	4.3%	5.5%	4.7%	B-	Ahem.
Productivity	13.7	13.7	14.3	15.9	16.9	C	Good! Continuous improvement.
Inventory Turns	5.3	6.5	12.2	14.2	16.6	A	Outstanding.
					Overall Grade	B-	

rating, Ford is going to have to scrap its "Best Built American Cars" advertising campaign and relinquish that honor to General Motors if present trends continue. That's why Ford got a 'D' for quality.

For its part, GM moderately improved its quality. But we still have to wonder if this is a result of more inspection and repair work rather than an indication of doing it right the first time. What is GM's first time quality?

American Motors has shown a definite improvement, but it still hasn't met the quality rating it got three years ago. Therefore the big improvement only earned it a 'D+'.

How They Were Graded

To determine who got what grade, ***AI***'s editorial staff selected six categories that would measure the overall efficiency of a company. Then we dug through old annual reports to develop trend lines in each of those categories for each company.

Each company was then graded according to these trend lines. We weren't looking for who got the highest numbers in any category. Instead, we looked to see if a company was improving compared to its prior performances.

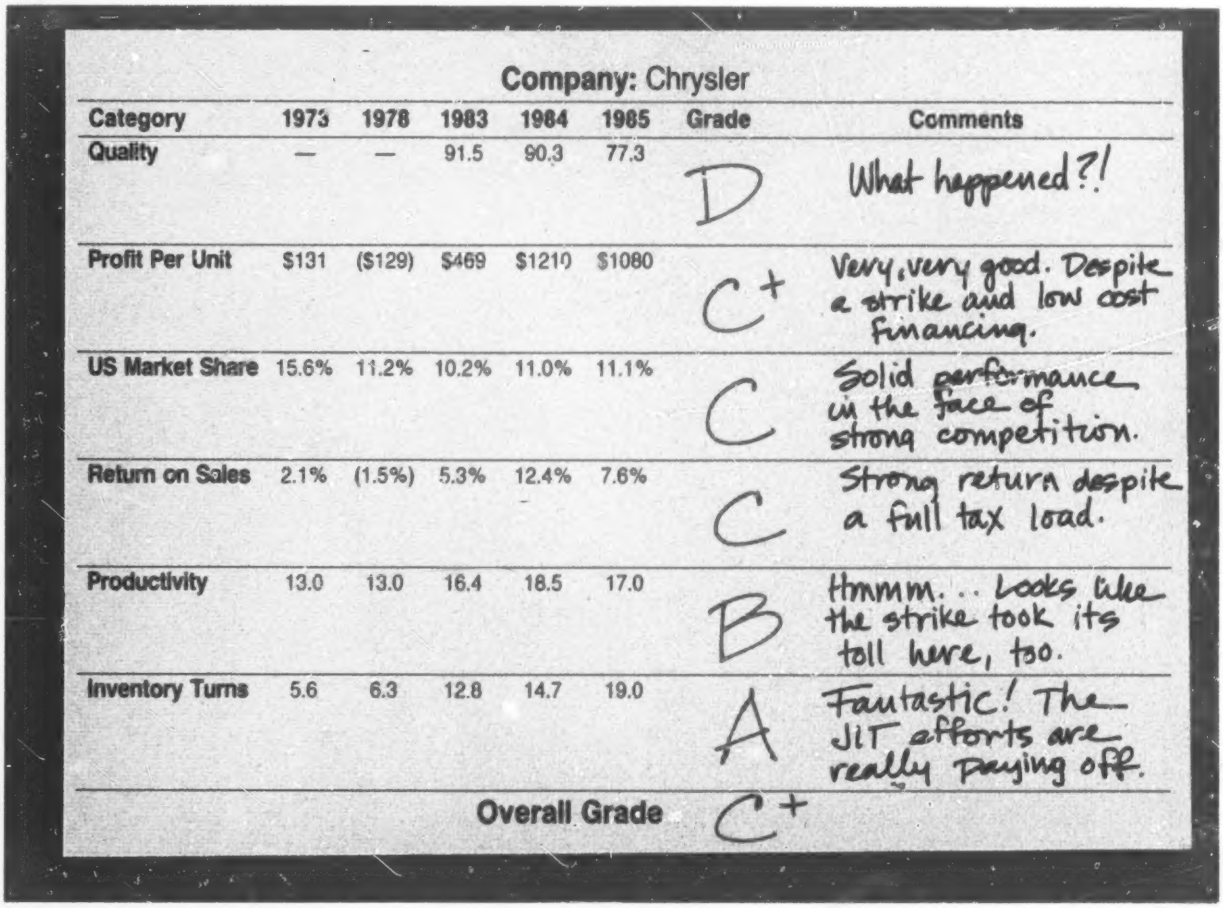
If a company had an outstanding improvement, it was given an A. As long as it showed overall improvement, it was given a B. If there was no improvement, it was given a C. If it was falling behind what it had achieved before, it was given a D. If it was failing, it was given an F.

As always, everyone has a different idea of who should get what grade. So, to help eliminate any bias, ***AI***'s editorial staff each submitted their own grades and we averaged them to get what you see here.

Profit Per Unit

This category shows how much profit each automaker made on each vehicle it sold. It also shows that each automaker earned substantially less than it did the year before. This was primarily due to low rate financing campaigns. And GM and Chrysler were hit by strikes that also reduced their profits. Nonetheless, Chrysler's performance is nothing short of astounding. It is making nearly twice

(Continued)



Company: Chrysler

Category	1973	1978	1983	1984	1985	Grade	Comments
Quality	—	—	91.5	90.3	77.3	D	What happened?!
Profit Per Unit	$131	($129)	$469	$1210	$1080	C+	Very, very good. Despite a strike and low cost financing.
US Market Share	15.6%	11.2%	10.2%	11.0%	11.1%	C	Solid performance in the face of strong competition.
Return on Sales	2.1%	(1.5%)	5.3%	12.4%	7.6%	C	Strong return despite a full tax load.
Productivity	13.0	13.0	16.4	18.5	17.0	B	Hmmm... Looks like the strike took its toll here, too.
Inventory Turns	5.6	6.3	12.8	14.7	19.0	A	Fantastic! The JIT efforts are really paying off.
					Overall Grade	C+	

the profit that Ford does on each vehicle it sells, and has a $600 advantage over GM.

Is Chrysler really that much better run than GM or Ford? No, not really. The great bulk of that advantage can be attributed to their outsourcing levels. Chrysler buys 70% of the parts and components it uses to make its cars and trucks. GM, by comparison, only outsources 30%. In other words, GM builds 70% of a vehicle with $24 an hour UAW labor. Chrysler builds 70% of a vehicle with labor that costs $17 an hour, or even less than that.

Even so, Chrysler's profit per unit trend line still outperformed all others and that's certainly a sign of good management.

US Market Share

The domestic automakers knew they would have a tough selling job when the Japanese increased their import quota by 24% a year ago. Even so, the domestics were pretty much able to hold their own because the total market grew.

But what price glory? The low rate finance campaigns the domestics resorted to last summer were able to move a lot of cars, but they turned into give-away programs. For example, even though GM set an all-time sales record in the third quarter, the company still lost money.

The truly bright spot was in trucks, which broke the sales record that was set back in 1978. Indeed, it was truck sales that pulled the industry to its all-time record in 1985. Car sales turned in their third best showing. But this is misleading. If imported cars are subtracted from the total, the domestic automakers didn't even sell the same amount of cars that they did twenty years ago.

Thankfully, all the domestic producers sold near-record amounts of trucks. It was their second best showing in history. And AMC's Jeep operations saved the company from total oblivion. Yet, there is a dark cloud on the horizon. Import truck sales hit 786,000 units (the equivalent of more than three assembly plants' output) despite a 25% import tax!

Return On Sales

This category measures what percent of total dollar sales each company can keep for the bottom line. Here too, 1985's results were below what they achieved the year before. But Ford and Chrysler didn't carry a full tax load in 1984, so their returns were expected to drop once they got socked by Uncle Sam.

Nontheless, there were other fac-

Company: American Motors

Category	1973	1978	1983	1984	1985	Grade	Comments
Quality	—	—	76.0	51.5	65.0	D+	A big improvement, but still a long way to go.
Profit Per Unit	$147	$101	($674)	$35	($378)	F	Gulp!
US Market Share	3.5%	2.3%	2.7%	2.8%	1.9%	F	Double Gulp!
Return on Sales	4.3%	1.4%	(4.5%)	0.36%	(3.1%)	F	Triple Gulp!
Productivity	18.2	17.1	16.8	18.1	14.7	D	Kenosha closings kept this number down.
Inventory Turns	7.2	6.4	12.0	15.3	15.5	C+	Well, it's an improvement.
					Overall Grade	D-	

tors worth examining that caused profits to slip. As already noted, low cost financing programs cut heavily into profits, and GM and Chrysler were hit by short strikes. Then too, GM's highly touted reorganization has not yet favorably impacted the bottom line. GM was also saddled by heavy losses ($327 million) in Europe and the high cost of launching new products. Ford, on the other hand, elected to concentrate on profits instead of market share in Europe and saw its profits nearly double.

Productivity

What this category measures is how many employees a company needed to build all the vehicles it produced last year. It measures efficiency on a world-wide basis, but eliminates any subsidiaries that have nothing to do with automotive production such as GM's Hughes Electronics, Ford Aerospace or Chrysler First (the financial group).

Ford, GM and AMC all showed productivity improvements, and Chrysler's drop is presumably related to the production it lost to two separate strikes it suffered in the US and Canada. Manufacturing people usually look for an improvement in quality when productivity increases. But the quality ratings show that the increase in productivity came more from all the overtime the automakers ran last year, rather than from better manufacturing methods. Indeed, the decrease in profits also suggests that the productivity increase was due to overtime, because it certainly had no positive effect on the bottom line.

Inventory Turns

This section measures how well the automakers are implementing just-in-time (JIT) production. The more turns they have, the more efficiently their operations are running. This is the only category where all the domestic manufacturers were able to show an improvement.

Additionally, this is probably the one area where all the overtime they ran actually had a positive impact. With many of their plants humming along at full speed, there was no need to stockpile huge banks of parts and components.

But it's probably unfair to attribute the inventory improvements solely to overtime.

All the domestic automakers, and even their suppliers, have been working diligently to reduce the amount of inventory they carry. And as the report card shows, that effort is paying off. AI

CHEAP GAS! WEAK DOLLARS! OH, WHAT A FEELING!

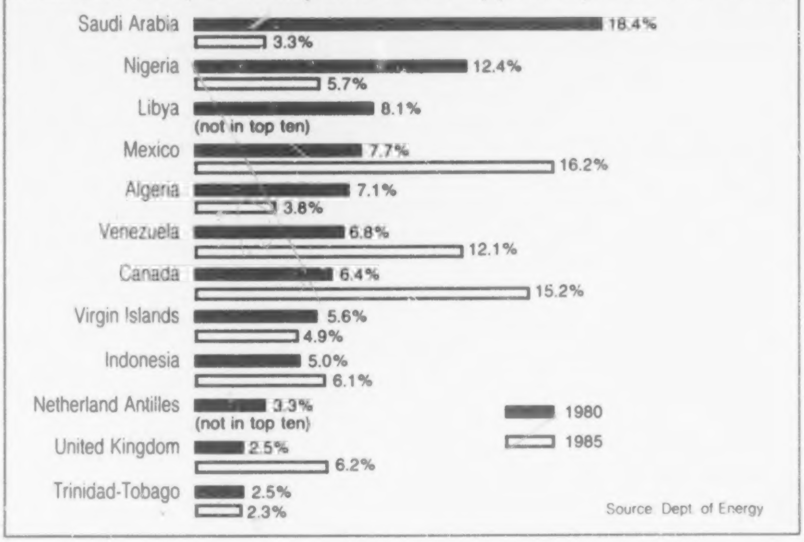
The one-two punch of lower gas prices and weak dollars could mean blue skies for domestic automakers in their battle with the Japanese.

by Lance A. Ealey

Nineteen eighty-six just wasn't supposed to work out this way. Automotive product planners at the beginning of the decade were looking for gas prices to *start* at over $2 a gallon, and the oracles at major US automakers and suppliers were beginning to think big in terms of moving sourcing and even production off-shore to gain an edge on the locomotive-like strength of the dollar.

Instead, we get unleaded gasoline selling for under a buck a gallon and possibly headed for $8 a barrel, and greenbacks hobbling along at 180 yen, down from 250 yen in 1982. While both developments are apparently unrelated, they could mean big medicine in terms of getting domestic car producers into world-class fighting trim.

America's Top Ten Imported Oil Suppliers (1980 Vs. 1985)



Source Dept. of Energy

What Cheap Gas Means

For GM and Ford, cheap gas is really something of a Trojan Horse. The pleasant part is that people are clamoring for bigger, V8-powered cars; a market segment from which both automakers draw their biggest profits. The part involving the Greeks is that neither company will meet Corporate Average Fuel Economy (CAFE) standards for 1987-88 unless they're reduced from 27.5 mpg to 26 mpg. (See box)

Chrysler, on the other hand, can meet the standards, but doesn't have enough big car firepower to take full advantage of the current sales boom. And you can't ignore the recent push upscale by the Japanese, which could significantly eat into big car sales.

Still, cheap gas should do big things for car sales. "It's estimated that there may be as much as $80 billion that will not be spent on oil imports," says Tom O'Grady of Integrated Automotive Resources, Inc. "That $80 billion would be 'respent' in a sense on other products in the United States."

A recent University of Michigan forecast indicates that if oil prices remain near $16 a barrel, US auto sales could climb by 700,000 units this year and by 1 million units for 1987, for total car sales of 11.2 million and 10.8 million for 1986-87 respectively.

That 700,000 unit figure "sounds a bit generous," says David C. Munro, general director of macro and international economics for General Motors. "We've raised our publicized comment on North American Vehicles, between the beginning and the middle of the model year, by about a third of that 700,000."

And Chrysler, in a marked non-Rambo-ish mood, raised its car industry forecast by a scant 100,000 units. "Maybe 700,000 is a unit expression of the total amount of money that will be spent on transportation, but we feel that a considerable amount of it will go for a richer segmentation mix, and some of it will go for driving more miles," says Chrysler corporate economist Donald P. Hilty. Besides, says Hilty, "We like to see the surprises on the upside."

How long can the oil bonanza last? "At this point, we think we're looking at two years of stable or decreasing fuel prices," says Richard Klimisch, executive director of environmental activities staff at the GM Research Center. Still, adds Brent T. Upson, general director of economic analysis for GM, it could mean relatively cheap gas for the next decade.

"We are not as dependent on the Persian Gulf area [see chart]," Upson

The Case For Lowering CAFE

(Fuel Costs for 15,000 mile/year, based on EPA formula.)

	Gas Price Per Gallon			
	$1.25	$1.00	85¢	75¢
Chevy Sprint	$399	$319	$271	$239
Honda Civic	$585	$468	$398	$351
Lincoln Town Car	$892	$714	$606	$535

Without playing favorites among GM and Ford, who want the CAFE lowered to 26 mpg for 1987-88, and Chrysler, who can meet the existing 27.5 mpg level, if you look at the accompanying chart, the case for lowering the CAFE, from the consumer's viewpoint at least, becomes clear. If a gallon of unleaded regular drops from $1.25 to 75¢, the cost to fuel the Town Car is less than fueling the Civic at $1.25. At 75¢ per gallon, you could drive a Sprint across the US five times for under $250.

notes. "There's been a great deal of conservation. There's been a big expansion in production capacity for petroleum outside of OPEC. And there's been the development of very major stockpiles, particularly our so-called strategic petroleum reserves, which makes us less captive to temporary interruptions in the Persian Gulf. We think it's a sign of better times energy-wise, for the future."

Japan's Sticker Shock

Japanese automakers could be forced into raising car prices by as much as 20% in order to make up the profitability lost to the weak dollar, if the worst case senario makes it to the big screen.

Chrysler's Hilty says the Japanese had built in hedges against the rise of the yen by forwarding contracts 12 months ago based on the value of the then-weak yen. Those hedges have now been clipped, however.

"We feel that the Japanese government did alert them that the yen would be allowed to appreciate," Hilty explains, "so most of the Japanese auto companies hedged their dollar revenues. They brought currency forward so that they didn't have any effects of a stronger yen for about at least a year."

That, combined with the increased buying power of the strengthening yen in terms of raw materials, means that "in the last 12 months or so, they have made more money selling cars in the United States than they did before," notes Hilty.

Now, Hilty says, profits are going down, so Japanese car prices are going up.

"There was a round of increases in December/January that amounted to about 4%," he says. "We now see another round happening that seems to be on the order of another 5%. The yen has appreciated about 30%, so the 9% or 10% increase in prices is not a full reflection yet of the increase of the value of the yen.

"People who study the yen in detail say that between 30% and 70% of the yen's appreciation will be passed on," Hilty continues, hence the possible 20% increase in prices. "We would hope that at least half of it would be passed on in the auto industry. If between 50% and 70% is passed on, we think we would be getting close to a level playing field."

Some Japanese automakers could actually find the playing field sloping the other way. While cautioning that "It's no more than word of mouth to my knowledge," GM's Munro says that word has it "the Japanese makers were setting their pricing decisions and product planning on a 220 benchmark. And when they were at 258 they were making a little extra than they had planned, and hitting us a little harder. And that they probably still had some decent margin down around 200, and maybe by the time you got to 180, they were barely breaking even."

In any case, says Munro, the pricing impact is apparently trickling down to the dealer level. "The Japanese have apparently been raising their wholesale prices a little more than their list prices. In other words, they have been tightening their profits, but they've also been tightening the profit belt of their dealers."

Now comes the $64,000 question: Will US automakers follow the Japanese in raising prices, or will they fend off the shareholders and maintain their present pricing structure, thus gaining in price competitiveness?

"Sanity would dictate that one does not follow," says O'Grady, "particularly with the domestics scrambling for more competitiveness between their products and the Japanese."

Adds Paul W. McCracken of the University of Michigan, "An exchange rate of 170 isn't going to produce a balance in the cost relationships between the industries in Japan and the US. Japan would still have an advantage, although less of one. With the yen down around 170, the ball is in the American industry's court to try to meet the competition." *(See Maryann Keller's column on page 12 for more on this subject—ed.)*

Additionally, the weaker dollar could change the minds of some US automakers and suppliers about sourcing outside of the United States. "There's no question it changes the exchange rate calculus in favor of the US," says GM's Munro. Adds Chrysler's Hilty, "There are some currencies that are pegged to the dollar, like the Brazilian cruzeiro and the Korean won, so it would still be beneficial to source in those countries."

Will the yen drop further? John Deaver, Ford director of economics, pegs 150-160 yen as a good exchange rate "To get our current accounts into reasonable balance." Still, he admits, whether it will drop that far is another matter entirely.

Adds Paul McCracken, "If the yen fell below 170, I'm sure you'd find the Japanese government under heavy pressure to take whatever action was needed to strengthen it." AI

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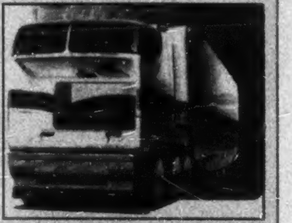
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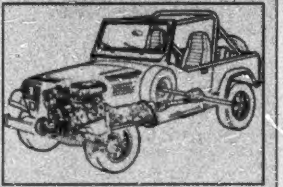
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MARKET PULSE

AUTOMAKER QUARTERLY REPORT

First quarter '86 results reflect the impact light trucks are having in the US and the tremendous market share battles raging in Europe and Japan.

by Tom O'Grady

Domestic Auto Sales (1st Quarter Results)

Carline	'86	'85	% Change
Cavalier	100,079	103,393	(3.2%)
Celebrity	99,230	80,687	23.0%
Escort	91,843	85,024	8.0%
Ciera	82,441	79,332	3.9%
Accord*	70,164	72,339	(3.0%)
Tempo	65,462	92,281	(29.1%)
Century	57,833	51,331	12.7%
Supreme	57,432	53,449	7.5%
Chevrolet	54,069	63,880	(15.4%)
Grand Am	46,697	26,049	79.3%

*—Includes imports
( )—Negative value

'85 Domestic Light Truck Quarterly Production

Truckline	3-'85	4-'85	1-'86
Chrysler Vans	19,864	29,260	35,643
. Sport Utility	5,773	5,761	6.407
....Miniwagon	58,348	60,684	75,881
Light Conventional	54,294	53,167	5,660
Ford Aerostar	15,134	32,317	48,654
..........Bronco	11,879	13,257	13,373
..... Econoline	41,104	61,523	61,782
.... Ranger	51,959	58,287	81,879
...... Bronco II	22,899	30,660	34,147
Light Conventional	133,945	140,952	109,848
Chevy..Blazer	10,136	12,025	9,802
......Suburban	16,387	12,271	17,766
.... P-Model	7,034	8,649	9,898
..............S-10	60,833	49,287	64,080
........Blazer S	53,298	46,090	48,460
............Astro	31,609	33,845	39,317
.... Van	34,026	48,987	50,348
Light Conventional	104,048	106,056	120,943
GMC . Jimmy	2,577	3,093	2,394
.... Suburban	6,457	4,746	6,000
........P-Model	1,368	847	1,659
..............S-15	15,797	12,568	16,952
...... Jimmy S	13,875	5,596	12,588
.... Safari	8,259	8,284	9,314
.... Van	9,951	12,599	14,487
Light Conventional	36,269	35,411	40,225
Nissan.Pkup	28,103	29,908	18,463

Passenger Car Market Share By Geographic Base

Manufacturers	Total Sales	Total Market Share
American	1,737,300	67.78%
Japanese	537,089	20.96%
European	134,780	5.26%
US Built Imports (VWoA, Honda, NUMMI, Nissan, Renault)	153,801	6.00%
Total	2,562,970	100.00%

US Passenger Car Market Shares To Date

Manufacturer	Sales	% Total
General Motors	1,098,330	47.05%
Ford	465,131	19.92%
Chrysler	261,850	11.22%
Honda	145,157	6.22%
Toyota	124,291	5.32%
Nissan	121,614	5.21%
VW	49,616	2.13%
Subaru	48,399	2.07%
AMC/Renault	20,238	.87%

Tom O'Grady heads Integrated Automotive Resources, Inc. in Wayne, PA. International data supplied by Automotive Industries.

Europe's Top 10 Sellers For '85

Company	Total	% Market	% Sales Change
VW/AUDI Group	1,360,758	12.93%	+11.5%
Fiat/Lancia	1,294,901	12.30%	+ 0.9%
Ford	1,256,949	11.94%	(3.1%)
PSA	1,224,469	11.63%	+ 5.2%
GM—Opel/Vauxhall	1,189,596	11.30%	+ 6.7%
Renault	1,127,735	10.72%	+ 2.3%
BL—Austin-Rover	419,166	3.98%	+ 6.2%
Daimler-Benz	394,824	3.75%	+19.0%
Nissan	298,048	2.83%	+ 6.3%
BMW	287,757	2.73%	(4.5%)

( )—Negative value

Japan's Top Domestic Nameplates (1st Quarter '86)

Company/Car	Total Sales
Toyota Corolla	58,934
Nissan Sunny (US Sentra)	54,322
Toyota Carina	44,349
Toyota Mark II	44,008
Nissan Blue Bird (US Maxima)	42,746
Toyota Corona	35,542
Toyota Starlet	32,165
Mazda Familia (US 323)	31,319
Toyota Crown	28,807
Honda Civic	27,272

Japan's Domestic Production & Sales Cars & Trucks (1st Quart. '86/Units)

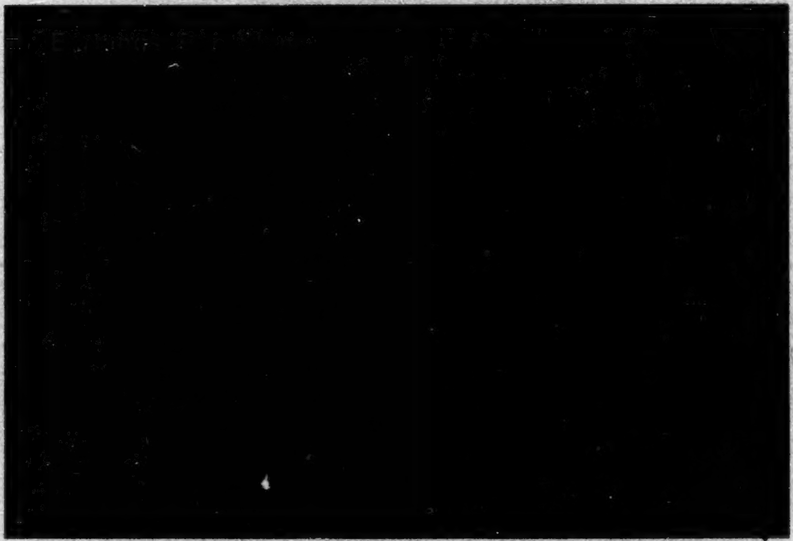
Company	Production	Sales
Toyota	921,866	470,214
Nissan	577,618	300,780
Honda	311,041	102,996
Mazda	308,333	86,143
Mitsubishi	305,052	102,518
Total	3,075,695	1,334,510

FINANCIAL SNAPSHOT

Stock Prices

Last quarter we listed Subaru and Ford as numbers one and two respectively among auto stocks in earnings per share. Since then, Subaru moved from 152.75 to 235.5 and announced an 8 for 1 split; Ford moved from 58 to 80.25. A strong December, January and February helped the performance and outlook for 1986. We expect the continued incentive programs to carry us through 1986. The production plans of domestic manufacturers for the second quarter are almost identical to last year's schedules during heavy finance incentives.

Stock Earnings



Earnings per share of common stock reflects the profitability of each company during the year. The continued success of Subaru is an amazing feat during a time when competition is at record levels. We expect this to continue for at least another couple of years until other manufacturers start to penetrate the 4wd auto market. The introduction for Honda of the Acura division, and Honda's expanded US production slows earnings down for now, but both are very healthy signs for the long-term outlook. Our earnings per share rankings for 1986 are: 1. Subaru; 2. Ford; 3. GM; 4. Chrysler; 5. Honda; 6. AMC.

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CHILTON'S

JUNE 1986

AUTOMOTIVE INDUSTRIES

SINCE 1895

Chevy's chief engineer with Corvette Indy

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Supplier Issue

JUNE 1986 VOLUME 166, No. 6

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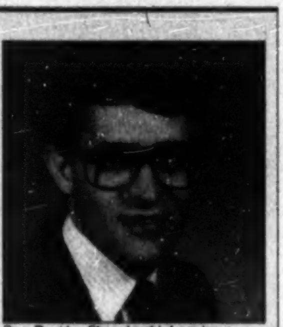
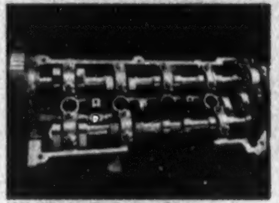

Don Runkle, Chevy's chief engineer.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Outlook: Heavy-Duty Survivors Battle Back

Manufacturers are rebounding slowly from the early '80s slump—but don't rule out a truckmaker shakeout or expect a quick upturn in ag.

by Douglas Williams

Comparing the massive downturn in the truck and heavy duty markets since 1980, to the troubles experienced by the passenger car business in the same time frame, may be a bit like likening a summer zephyr to a typhoon. By comparison, the car people had it easy.

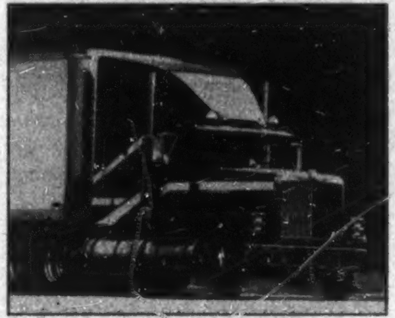
Yet despite years of turbulence, the long-anticipated shakeout among truck and heavy duty manufacturers mostly hasn't happened. This has surprised Duncan Brodie, head of sales at General Motors Truck and Coach, who predicts that such a trend can't be far away. "I just want to be certain that we're not among those shaken out," Brodie says.

And the truckmakers' suffering pales next to what the ag and construction businesses have endured recently. Cummins Engine decided over 18 months ago that "we would be wise to plan on no growth in the North American heavy duty truck market and on declines in heavy construction and in the agricultural equipment market."

John Deere makes this observation in its current annual report: "All of our major competitors in farm machinery have in recent years either consolidated with a larger enterprise or received direct assistance from their host government."

Bullish On Cat

Given these dismal market conditions, how have the truck, ag and construction industries faced the unprecedented downturn of the past half decade? In a nutshell, the survivors have performed well—from better than acceptable to very good indeed.



A strong product range has helped Navistar International turn four straight quarters of black ink. Shown is the 9370 tractor, introed in '85.

Helen Walters, who follows Caterpillar and Deere for the Smith Barney brokerage firm acknowledges that Cat started cutting costs a little late. "But then," she says, "they charged forth in all directions to maintain their market share and augment their presence in the total market." Walters notes that Cat's cost reduction efforts are starting to show results.

Drexel Burnham's Jim McCann agrees. He says Caterpillar has "acknowledged they reacted a little slower than they should have. But given the competitive environment, they did pretty well and are going to be pretty competitive from now on."

John Deere "would be losing buckets full of money if they hadn't taken stringent cost cutting moves," says Smith Barney's Walters, who like most agricultural equipment analysts doesn't see an ag upturn for the foreseeable future. "It helps to skinny down, but if you get skinny and nobody's buying, you stay skinny," she says.

"Deere is in a position to expand their market share," notes Alex Blanton of Merill Lynch. He says that because Deere is the low-cost producer, they'll have large incremental profits as volume picks up. But Blanton adds that wheat and corn prices are very low, with little prospect of improvement there. To Blanton, most of Deere's problems are coming from Washington's farm programs.

When it comes to Caterpillar, Blanton's very bullish. He notes that in Cat's markets, some 60% of buyers are price sensitive, while Caterpillar dominates the other 40%. He adds that the resale value of Caterpillar equipment "is double anyone else's."

You can't talk heavy duty without including Cummins Engine, the Columbus, IN-based diesel manufacturer. Last July Cummins announced a company-wide personnel and cost reduction program that shocked both its competition and customers. Eight months later, however, those same people grudgingly acknowledged Cummins' move and timing were spot-on.

Cummins' Big Cuts

Cummins divides its recent past into three periods: 1979-80, when development began on a new line of engines in both traditional and lower horsepower ratings; 1981-83, when the recession forced the company to accept slower growth (Cummins increased its prices at only one-half the rate of inflation, and set a goal of reducing manpower in the base diesel engine business by 30%); and 1984-85, when Cummins realized it had to plan on no growth in the heavy truck market and declines in ag and construction. Tightening international

(Continued)

(primarily Japanese) competition caused the company to reduce prices.

Cummins now claims it has lowered prices by up to 40% on its three new engine families released in the last three years, while simultaneously cutting the price of its NH/NT engine series (the primary Class 8 truck engine) by 5%. The intent, says Cummins, "is to be price competitive with the Japanese now, in order to deny them market share."

OEM MARKET SHARES (US CLASS 8 RETAIL SALES)

	1981	1982	1983	1984	1985
IH (Navistar)	24.9%	23.4%	24.6%	23.0%	21.4%
Mack	17.0	17.4	15.4	17.2	17.7
Freightliner	9.7	10.1	13.4	12.8	13.5
Ford	9.6	12.5	9.5	9.0	11.4
Kenworth	10.6	9.6	10.1	9.8	8.9
Peterbilt	7.1	7.8	10.2	10.0	8.9
Volvo White	4.9	6.2	6.6	6.9	8.8
GMC	13.2	12.1	9.8	10.9	8.7

Source: Volvo White

Selected Heavy-Duty Performance '85

(All Dollars In Millions)

Company	Sales	Net Profit	No. Employees
Caterpillar Tractor	$6,725	$198.0	56,000
Cummins Engine	2,146	50.4	20,000
Deere	4,000	24.3	42,000
Mack Trucks	2,000	(59.8)	13,700
Navistar International	3,457	105.4	17,000
Paccar	1,893	72.9	9,100

( )—Denotes loss

Ups And Downs

This is how truck industry insiders are viewing the respective manufacturers:

Navistar has done reasonably well, for a company that hung on the edge of extinction for so long. Product lineup is considered strong, "one of the best in their history," according to one competitor. The company's been in the black now for four consecutive quarters (since selling the agricultural equipment business to Case/Tenneco). Competitors consider Navistar's winning the confidence of the Harvester dealer body back no mean feat; the positioning of the new name and image is a another major accomplishment.

Navistar's tie-up with Nissan Diesel (ND) is bringing it new product. This summer will see Navistar move aggressively into Classes 4 and 5 with the 400 and 500 low cab-forward ND-built trucks. And Navistar's 6.9-L V8 diesel that's used in Ford light trucks is at full production capacity; Ford has extended its contract through mid-1990.

GMC says it's increasing Class 8 production to 48 units a day, up from 32 since last September. Despite that move, *T&OHI* could find no one inside or out of GM at the recent International Truck Show in San Francisco who thinks the General's truckmakers are operating at a profit. Some industry observers consider the GM division to have "a tired product lineup," and surprisingly small clout in the market.

Also on the GM front, the wheels of the **DDA-Deere** diesel engine joint-venture have slowed down considerably, reportedly due to personnel and legal snags. Together, both companies would have a solid product fit.

Ford Truck is moving strongly, increasing market share and broadening its product line with its medium-duty "world truck," the Cargo. "I think they've got more truck focus than they've ever had before," says an admiring competitor of Ford.

Freightliner and **Volvo White** are two other companies that are commanding respect (see feature story this issue). Both are aggressive, and producing impressive new products.

Mack recently slipped to third place in the Class 8 market, behind Navistar and Freightliner. Confusion and concern about moving its main assembly operation south, to Winnsboro, SC are credited for some Mack problems. Others include some bad luck timing in bringing out the Ultraliner cabover just when the government tax regulations turned the market in another direction.

The Paccar duo—**Kenworth** and **Peterbilt**—reported a thin profit for the past year. Kenworth now has a genuine leading-edge product in its slick T600A conventional, and both truckmakers have a real plus for the ultra-hot Class 6 and 7 market with their Brazil-sourced, VW-M.A.N. mediums. Although Paccar closed its Kansas City plant, the West Coast-based truckmakers continue to be very successful in selling to leased truck operators.

Any way it's measured, the response of heavy duty manufacturers to the new global market has ranged from adequate to superior. ■

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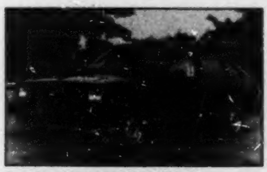
Even as the Big Three nail shut the coffin on the US-built entry-level car, the prospects for home-grown price leaders may never be better.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Fiat gets profitable in a tough market through a combination of automation, a best-selling small car and world class subsidiaries.

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The UAW's president talks tough and threatens labor war even though contracts with GM and Ford don't run out for a full year.

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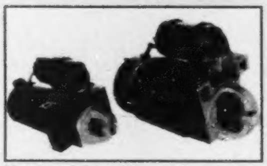
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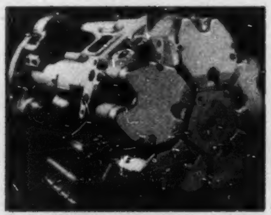
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MARKET PULSE

AUTOMAKER QUARTERLY REPORT

Second quarter '86 results reflect the effect of price rises on Japanese market share and the continued tightening of the entire US auto arena.

by Tom O'Grady

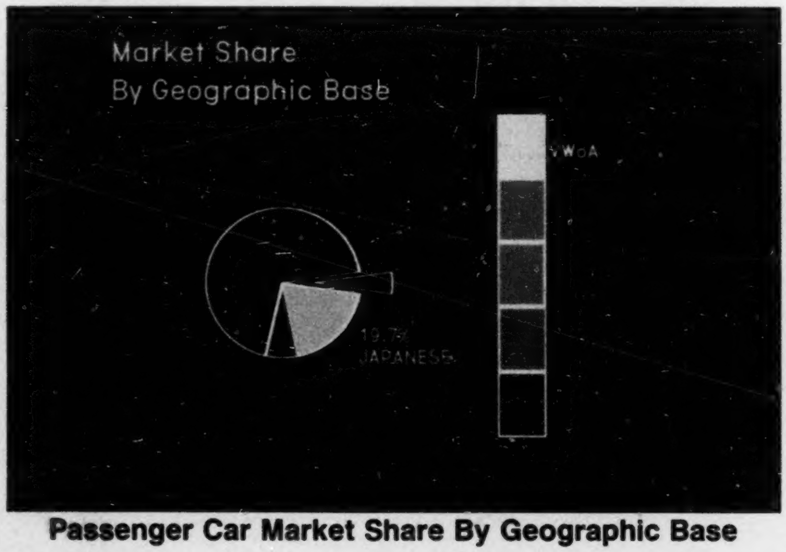
Domestic Auto Sales (2nd Quarter Results)

Carline	'86	'85	% Change
Celebrity	217,801	181,617	19.9%
Cavalier	207,243	232,584	(10.9%)
Escort	198,916	201,632	(1.4%)
Ciera	170,878	174,862	(2.3%)
Accord*	142,772	147,263	(3.1%)
Tempo	128,057	157,339	(18.6%)
Chevrolet	121,587	130,991	(7.2%)
Century	121,008	115,607	4.7%
Supreme	117,295	114,396	2.5%
Olds 88	116,110	110,836	4.8%

*—Includes imports
( )—Negative value

'86 Domestic Light Truck Quarterly Production

Truckline	4-'85	1-'86	2-'86
Chrysler Vans	29,260	35,643	29,344
. Sport Utility	5,761	6,407	6,663
....Miniwagon	60,684	75,881	77,051
Lt Conventional	53,167	5,660	34,370
Ford Aerostar	32,317	48,654	45,827
..........Bronco	13,257	13,373	15,407
..... Econoline	61,523	61,782	62,902
.... Ranger	58,287	81,879	86,950
...... Bronco II	30,660	34,147	31,862
........Light Conv.	140,952	109,848	177,432
Chevy..Blazer	12,025	9,802	7,834
......Suburban	12,271	17,766	17,450
.... P-Model	8,649	9,898	13,141
..............S-10	49,287	64,080	61,889
.......Blazer S	46,090	48,460	42,389
............Astro	33,845	39,317	42,127
.... Van	48,987	50,348	43,383
Light Conventional	106,056	120,943	114,224
GMC . Jimmy	3,093	2,394	2,179
.... Suburban	4,746	6,000	6,398
.......P-Model	847	1,659	1,508
..............S-15	12,568	16,952	16,834
...... Jimmy S	5,596	12,588	11,539
.... Safari	8,284	9,314	10,394
.... Van	12,599	14,487	14,956
Light Conventional	35,411	40,225	39,658
Nissan.Pkup	29,908	18,463	46,222



Passenger Car Market Share By Geographic Base

Manufacturers	Total Sales	Total Market Share
American	3,876,923	68.74%
Japanese	1,108,845	19.66%
European	391,384	6.94%
US Built Imports (VWoA, Honda, NUMMI, Nissan, Renault)	263,052	4.66%
Total	5,640,204	100.00%

US Passenger Car Market Shares To Date

Manufacturer	Sales	% Total
General Motors	2,373,738	47.14%
Ford	1,006,493	19.99%
Chrysler	576,651	11.27%
Honda	306,439	6.09%
Toyota	277,780	5.52%
Nissan	263,682	5.24%
VW	110,551	2.20%
Subaru	91,463	1.82%
AMC/Renault	37,246	0.74%

Thomas O'Grady heads Integrated Automotive Resources, Inc. in Wayne, PA. (215) 647-6978.

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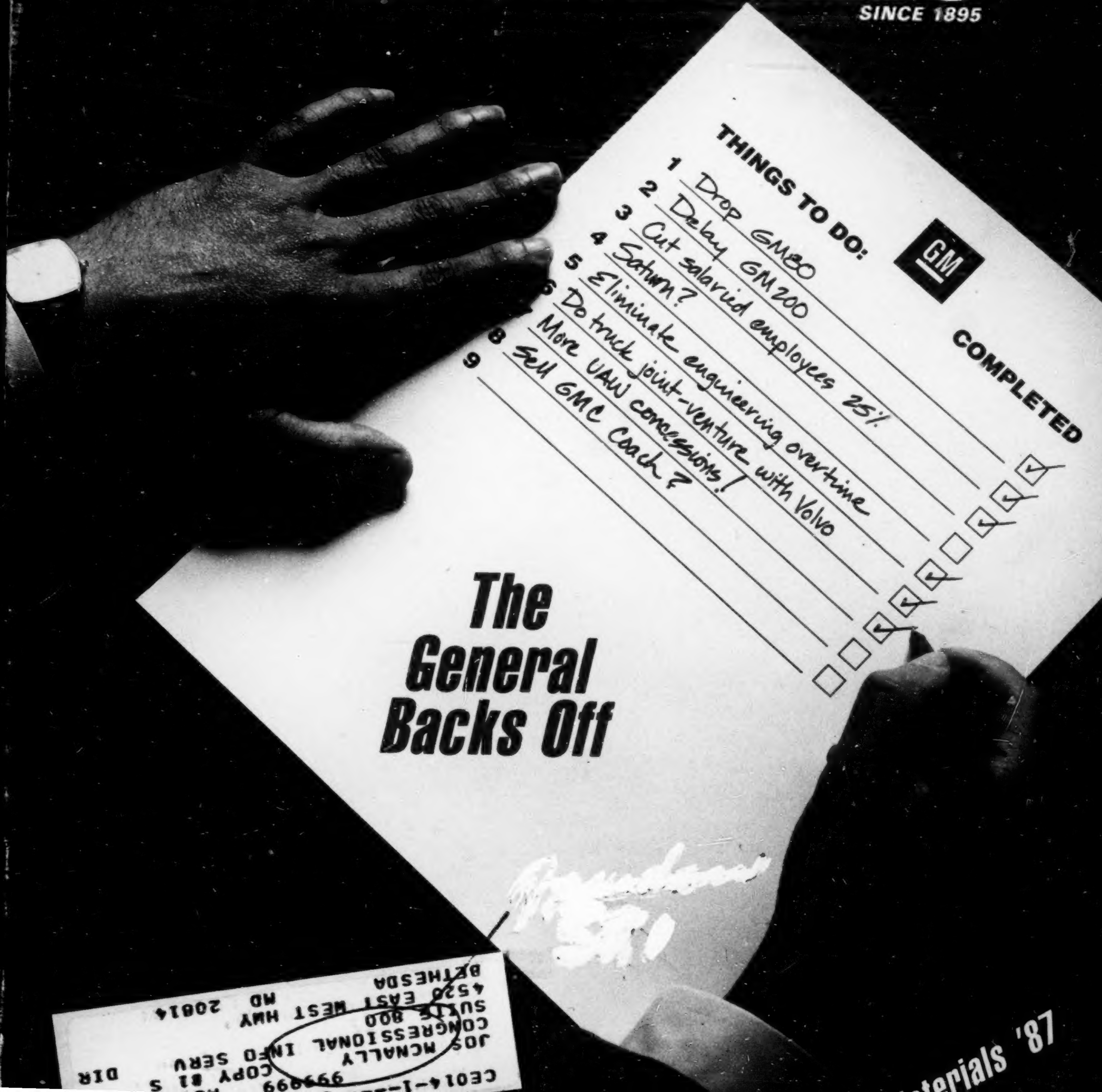
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COMPLETED
1 Drop GM80
2 Delay GM200
3 Cut salaried employees 25%
4 Saturn?
5 Eliminate engineering overtime
6 Do truck joint-venture with Volvo
7 More UAW concessions!
8 Sell GMC Coach?
9

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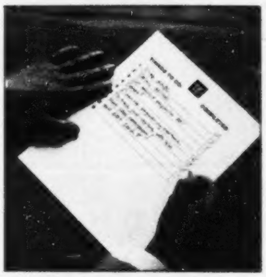

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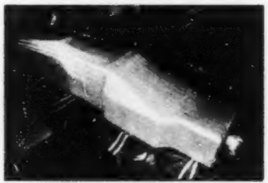

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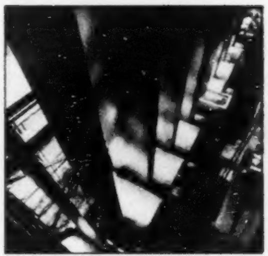

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AMC's Desperate Push For Cash

by Joseph M. Callahan

American Motors has embarked on a last-ditch effort to restructure its operations and provide AMC with $187.5 million in operating funds. That's how much the embattled company says it needs to continue operating until 1988, at which time it hopes to have enough salable new cars and Jeeps to get back into the black.

French Partner's Woes

Despite AMC's poor sales (down over 50%), the company has survived thanks to it's tie-up with French automaker Renault, which has supported it financially. Renault owns 46% of AMC.

But Renault, beset with its own sales decline and large losses in Europe, is clearly in no position to continue to shore up AMC's sagging fortunes.

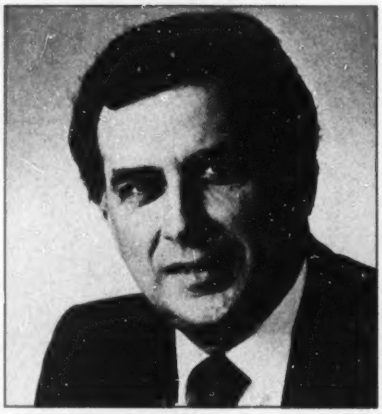
The first step in AMC's cash generating plan involved AMC stockholders approving the issuance of a new preferred stock. The stock was created after Renault agreed to convert the large debt AMC owes it, and a considerable portfolio of preferred stock, to "junior bonds" which get dividends after everyone else.

Buying Renault Parts

"We don't need these funds for our product program. Our product program through 1988 is fully funded," says AMC president Joseph E. Cappy. "What we need this money for is just to take care of the cyclical nature in the auto business. If suppliers look at our balance sheet and see a 2-to-1 debt to equity ratio, instead of a 12-to-1 ratio, they'll be more willing to give us better prices because they won't be afraid then to make the investments required."

Although Renault definitely will not supply AMC any more funds, Cappy read a letter from Renault chairman Georges Besse stating he fully supported AMC. AMC will buy up to $1.7 billion in parts from Renault in 1989 if its restructuring plan pays off.

Cappy also denied that AMC and Renault were looking for a merger with Chrysler Corp. or anyone else. Rumors of Chrysler buying AMC's Jeep operations and its new Bramalea assembly plant have been flying around Detroit recently.



AMC chief Joseph Cappy: Renault sends its regards.

Cappy said he hoped to finalize the deal shortly by which Chrysler Corp.'s M-body cars will be assembled at the AMC plant in Kenosha, adding that this will help AMC lower its breakeven point. Production will begin next February.

China Bucks

Questioned about AMC's troubled Jeep plant in Toledo, OH, he said a decision about continuing Jeep production in Toledo or elsewhere will probably be made later this year or in early 1987.

Cappy also reported that the Chinese Government has temporarily begun paying AMC hard currency for the Cherokees it has been buying and production of the vehicles has resumed at the Beijing Auto Works in that country. However, AMC must begin sourcing more Cherokee parts in China and exports of the vehicles must start this year.

For the last five years AMC has been saying that prosperity was just around the corner.

This time, the company won't have a second chance to make good on its promise. AI

Prophet Loss Dept.

If everyone sells as many cars in 1987 as they claim, its going to be one sizzling year. In fact, it'll beat out the best sales year ever, when 11,446,000 cars were sold in 1973. Praise the cracles and pass those bonuses!

Company	'87 Sales Projection
Chevrolet	1,816,000
Ford	1,357,000
Chrysler	1,140,000 (est.)
Oldsmobile	1,063,000
Pontiac	910,000
Buick	850,000
Honda	750,000 (est.)
Lincoln/Merc	700,000
Toyota	680,000
Nissan	620,000 (est.)
Cadillac	312,000
Volkswagen	260,000 (est.)
Mazda	220,000 (est.)
Hyundai	200,000
Subaru	200,000
Volvo	120,000 (est.)
Mercedes-Benz	95,000 (est.)
BMW	95,000 (est.)
Audi	65,000 (est.)
Yugo	63,000 (est.)
AMC	60,000 (est.)
Saab	50,000
Mitsubishi	50,000 (est.)
Isuzu	33,000 (est.)
Porsche	29,500 (est.)
Jaguar	24,000 (est.)
Peugeot	20,000 (est.)
Total	**11,782,500**

(est.)—Projections are based on recent performance and/or seat of the pants prognostication by auto company spokesmen.

RUST NEVER SLEEPS: DETROIT EMBRACES EG STEEL

American steel fires up five new electrogalvanized steel lines, fueling Detroit's drive for a 10-year rust protection standard.

by Bryan Berry

Give us more electrogalvanized steel! Detroit has been telling American steelmakers for the past ten years. After all, that's how long Japanese steelmakers have provided the coating to Japanese automakers for many outer panels. But until this year, the only American mill making the 72-in. wide (*1828 mm*) electrogalvanized (EG) steel suitable for most outer panels was USX Corp.'s (formerly US Steel) Gary, IN line.

That's all changed now. As of early this summer, five new American EG lines began shipping coated steel to Detroit. At full speed, they'll produce more than two million tons (*1.8 billion kg*) a year.

The new EG steels will give automakers a major boost in their drive to guarantee vehicles against ten years of rust-through corrosion and five years of cosmetic corrosion.

What's so special about electrogalvanized steel? The process electrolytically deposits rust-fighting zinc, iron, or nickel alloys on steel at much lower temperatures than the hot-dip galvanizing coating.

Electrogalvanizing is done at 140°F (*60°C*) compared with hot-dipping's 850°F (*454°C*). The high heat of hot-dipping tends to alter the steel and the coating varies in thickness.

Variation in coating thickness is also a problem with Zincrometal, the other coated steel used for many outer body panels. Zincrometal uses a zinc-rich paint over the steel.

Electrogalvanizing, however, doesn't alter the steel and has a much more uniform coating than hot-dipped or Zincrometal steel. The steel can be stamped, welded, and

Five new EG lines have recently begun to supply Detroit; output will hit two million tons at full production. Tower rolls shown store the steel so processing can be continuous.

The Five New EG Lines

Company	Location	Max. capacity (tons/year)
USX/Double Eagle	Dearborn, MI	700,000
LTV/Sumitomo	Cleveland, OH	400,000
National	Ecorse, MI	400,000
Bethlehem/Inland/Pre-Finish Metals	Walbridge, OH	400,000
Armco	Middletown, OH	400,000

The New EG Steel!

Automaker	EG Suppliers/Type
GM	Armco, Bethlehem, Inland, LTV/Two-side pure zinc.
Ford	Primarily USX and Rouge, some from the other four new EG lines/Mainly one-side pure zinc
Chrysler	USX, National/Two-side iron-zinc.
Honda Marysville	Probably Bethlehem, Inland, Armco/Probably one-side pure zinc.
Nissan Smyrna	Nippon, Kawasaki, Nippon Kokan/Zinc-rich paint over nickel-zinc on one side.
NUMMI	Nippon/Two layers of iron-zinc on two sides.
Mazda Flat Rock	Nippon, Kawasaki, Sumitomo/Two-side zinc-nickel.

painted much more consistently.

Electrogalvanizing is also much more flexible than the other processes. In a few hours coating thicknesses and alloys can be changed in the middle of a production run.

Detroit's Big Deal

General Motors will phase in EG steel slowly, buying about 390,000 tons (*320,833 t*) this year. That's 6% of the 6.5 million tons (*5.9 million t*) of total steel it plans to buy this year.

Last year GM bought the same total tonnage, including 130,000 tons (*117,910 t*) of EG. The automaker currently uses EG steel from USX's Gary line for the hoods and fenders on its Oldsmobile and Cadillac C-cars (Olds Ninety-Eight, Cadillac deVille); and EG from Nippon Kokan for the same parts on its Buick C-cars (Electra).

The first GM car line slated to make extensive use of the new EG lines is the E/K series (Buick Riviera, Olds Toronado, Cadillac Seville/Eldorado) built at the new Detroit/Hamtramck plant. The E/K cars presently use Armco's Ultrasmooth hot-dip galvanized steel for most exterior panels. Some time in 1987 GM will begin replacing Ultrasmooth panels with EG steel.

Electrogalvanized use at GM will really jump when the company begins building its compact Corsica/Beretta L-bodies (GM25) at several Chevrolet-Pontiac-Canada (CPC) plants in 1987. Also slated for EG steel are the Chevrolet Astro minivan; the '87 Buick Reatta (GM33) two-seater; and the intermediate W-body (GM10).

The No. 1 automaker has signed long-term contracts (into the '90s) to buy almost all of its EG steel from the Armco line at Middletown, OH; the LTV/Sumitomo line at Cleveland; and the Bethlehem/Inland/Pre Finish Metals line at Walbridge, OH near Toledo.

GM has assigned LTV to supply all the cold-rolled steel for its Buick City plant; LTV is likely to supply all the EG there, too. More than half of the EG steel from both LTV and Armco will go to GM.

Chrysler will convert most of its exterior panels from hot-dip galvanized to EG during the 1988 model year. The automaker first will convert its hoods, and then rear decks, to EG. Ford predicts that it will use 750,000 tons (*680,250 t*) of EG in 1988.

General Motors and Ford initially will use almost all pure-zinc coatings, while Chrysler will use iron-zinc. That's because the Big 2 generally have shorter electrocoat (E-coat) tanks in which they bathe their vehicles in Uniprime and other primers prior to painting.

The GM and Ford vehicles are electrocoated for two minutes; Chrysler has opted for a three minute bath. The Big Two's quicker times mean higher voltages (about 350V at GM) than Chrysler uses, which is the reason they use pure-zinc.

GM's 350 volt bath would cause pits and craters in iron-zinc steel. Chrysler claims its lower voltage dip doesn't degrade iron-zinc.

Chrysler has been using three-minute dwell times to E-coat hot-dip iron-zinc-coated minivans at its Windsor, Ont., plant since fall 1983. The automaker has had no problems with cratering, said Joseph H. King, Chrysler's manager of materials protection and joining.

The iron-zinc allow Chrysler to use a lighter coating weight than GM for lower cost, less welding power and fewer stamping problems.

The five new EG lines start out with a broad range of prices: National's are the lowest, at $680-700/ton; Double Eagle (the venture of USX and Rouge Steel), in the middle at about $720/ton; while some of the

(Continued on p. 88)

(Continued from p. 86)

with cold-rolled prices of around $550/ton.

Ford, for the present, will not coat the outside surfaces of most of its exterior panels. That's because the galvanic coating hurts the appearance of the paint, say company officials.

Industry officials outside Ford, however, say that the No.2 automaker doesn't have enough proper welding equipment in place to handle two-side-coated exterior panels. Welding coated steels like hot-dip or EG requires direct welds, not series equipment used for uncoated steels.

Japanese Requirements

Of the three Japanese automakers in the US, Nissan and New United Motor Manufacturing, Inc. (NUMMI) already are using EG steel. Honda plans to convert from Zincrometal to EG for some outer panels later this year. Mazda plans to use EG steel at Flat Rock, MI. So does Toyota at Georgetown, KY.

Japanese EG steel typically has a lighter coating than American EG due to Japan's higher power costs.

The Japanese compensate for their lighter coatings with two basic tactics: They either paint an alloy-rich (usually zinc or iron) coating over the EG coating, or apply two electrogalvanic coatings.

Nissan's car and truck plant in Smyrna, TN uses the first method. The inside surface of Nissan's exterior panels has a zinc-rich paint over a nickel-zinc EG coating.

NUMMI takes the other approach. The Nova outer panels use a double-layered iron-zinc EG coating.

So far the five new American EG lines are not producing either the painted EG or the double-layered EG coatings. That's because they're making EG steel to the American automakers' specifications right now. But the new American lines can and probably will be converted to the Japanese-style specs in the next few years.

For now, Nissan and NUMMI are buying all their EG steel from Japan. Nissan claims that the quality of American steel is not good enough for exterior panels. It buys only unexposed steel from American steelmakers LTV and Armco.

NUMMI, which buys unexposed steel from LTV, is evaluating other American EG steel.

Honda is the only Japanese automaker in the US that's now using American steel for exposed panels. Unlike most American automakers, Honda requires its steel suppliers to submit a metallurgical test report with each coil of steel.

Later this year Honda will convert from Zincrometal to one-side EG steel for the outer panels of its hoods, trunk lids, and sides. Like Ford, Honda plans to use one-side EG steel for outer panels for the foreseeable future.

"One-side steel is better than two-side from the standpoint of stamping, welding, and painting," said Chris Poland, Honda's assistant manager of stamping.

Honda currently is testing one-side pure-zinc EG coils from Inland, Armco, and Bethlehem. But it's also looking at the painted EG and double-layered EG steels available from Japan.

Mazda will use Japanese-made EG steel for outer panels for two or three years after its US plant starts up in 1987. Sumitomo, Kawasaki, and Nippon will supply two-side zinc-nickel EG steel to the Flat Rock plant.

The LTV-Sumitomo Electrogalvanizing (LSE) Co. uses the same technology in Cleveland that Sumitomo has in Kashima, Japan. Right now LSE is dedicated mainly to GM and Ford. By 1989, however, LSE hopes to begin shipping zinc-nickel EG steel to Mazda, too, possibly using not only LTV but also Sumitomo cold-rolled steel as the substrate.

Toyota currently is searching for American steel suppliers for both exposed and unexposed panels for its Georgetown, KY plant. "We'd like to use steel coated on the new American EG lines if tests show it's good," said one Toyota purchasing executive. Toyota presently is testing the cold-rolled products of several American steelmakers.

The new wave of electrogalvanizing lines is the most exciting development in American automotive steels since the advent of high-strength steels. The big question is: Which team of auto and steel makers will be the first to achieve corrosion protection good enough for 5-10 year warranties?

How The EG Lines Work

The five new American electrogalvanizing (EG) lines use different technologies, but the same basic design: Individual cells in which electricity passes through metal anodes set in an electrolytic solution and through the coil of steel. The electricity sets up an electrical flow of positively charged zinc or other alloys to the negatively charged steel.

Only Double Eagle has an American design. National's line was designed by Nippon Kokan, 50% owner of National Steel. Sumitomo designed the LTV/Sumitomo line.

The Armco line and the Bethlehem/Inland/Pre Finish Metals line use the Gravitel technology of Austrian Andritz Ruthner.

The Double Eagle line uses the same USX Consumable-Anode, Radial, One-Side, Electrolytic (CAROSEL) design run at Gary, IN since 1977. The steel is held taut around a metal roll so that only one side of the strip is exposed to the electrolytic bath.

The other four lines expose both sides of the steel to the electrolyte at the same time. They can apply different coatings to the two sides by turning off the electricity on one side of the steel in some cells.

In the Gravitel technology, the electrolyte pours down like a waterfall through a V-shaped weir over the moving steel. In the Sumitomo technology, the electrolyte is pumped against the steel.

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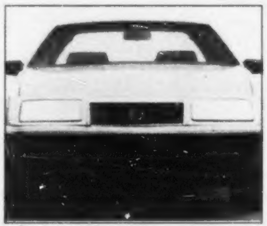
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ONE OF THE ABC PUBLISHING COMPANIES

Foreign Multi-Valvers Crowd US Market

by Joseph M. Callahan

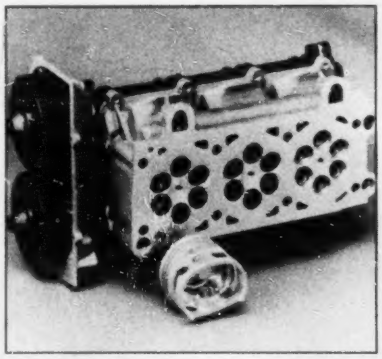
Over the past two years, twin-cam engines, previously all built by foreign manufacturers, have exploded into 271,550 unit market.

A total of twelve cars on the US market are now equipped with four valves per cylinder; this will increase to 23 models within 12-15 months.

Leader of the pack is Toyota with about 200,000 multi-valve engines now installed in five car lines marketed in this US. Worldwide, Toyota has sold over a million of the engines.

Much to the Big Three's embarrassment, the first US twin-cam engine—Oldsmobile's Quad 4—won't appear until 1988. It will be featured in GM's N-cars—Olds' Calais, Buick's Somerset and Pontiac's Grand Am. Chrysler's Italian-built Q-car will get a 16-valve four-cylinder engine when in debuts.

While nothing has been announced, the US could see Mazda's 16-valve and turbocharged 323 model which has already debuted in Japan.



An extreme example of multi-valveism yet to make it Stateside: Maserati's six-valves per cylinder V6.

Nissan features 16-valve engines in its home market Cherry and Pulsar models. Rumor has it Suzuki is looking at four-valve heads for its tiny Swift (Chevy Sprint in the US).

Advantages claimed for the multi-valve engine compared with the turbo approach are: Better fuel economy; no turbo lag; better reliability; lower maintenance costs; and improved engine life. At the same time, the improved breathing makes the engine much less prone to detonation and allows it to burn cleaner. AI

Air Heads On Parade

(Multi-Valve Engines sold in or coming to the United States)

Car	Size	Engine Features	How Many	Intro
Acura Legend	2.5 L	V6, SOHC, FI	7740	1986
Acura Integra	1.6 L	IL four, DOHC, FI	9965	1986
Toyota Corolla GTS	1.6 L	IL four, FI, DOHC	[1]	1985
Toyota Tercel	1.5 L	IL four, 12 valves, FI, DOHC	[1]	1987
Toyota Camry	2.0 L	IL four, FI, DOHC	[1]	1987
Toyota Celica GTS	2.0 L	IL four, FI, DOHC	[1]	1986
Toyota MR2	1.6 L	IL four, FI, DOHC	[1]	1985
Toyota FX16	1.6 L	IL four, FI, DOHC	[1]	1987
Toyota Supra	3.0 L	IL six, FI, DOHC	[1]	1986
Mercedes 190	2.3 L	IL four, FI, DOHC	1000	1986
VW Scirocco	1.8 L	IL Four, FI, DOHC	1368	1986
VW Golf GT	1.8 L	IL four, FI, DOHC	NA	1987
VW Jetta	1.8 L	IL four, FI, DOHC	NA	1987
Saab 900 Turbo	2.1 L	IL four, FI, DOHC	24,500	1985
Saab 900 S	2.1 L	IL four, FI, DOHC	13,800	1986
Saab 9000 Turbo	2.1 L	IL four,FI, Turbo, DOHC	9000	1986
Porsche 928 S	5.0 L	V8, 32 valve, FI, DOHC	4177	1985
Porsche 944 S	2.5 L	IL four, FI, DOHC	NA	1987
Jaguar XJ40	3.8 L	IL six, FI, DOHC	NA	1987
Olds Calais	2.3 L	IL four, FI, DOHC	NA	1988
Buick Somerset	2.3 L	IL four, FI, DOHC	NA	1988
Pontiac Grand Am	2.3 L	IL four, FI, DOHC	NA	1988
Chrysler Q Car	2.2 L	IL four, FI, DOHC	NA	1988

FI—Fuel Injected IL—In-Line SOHC—Single Overhead Cam DOHC—Double Overhead Cam [1]—Total Toyota: 200,000 engines

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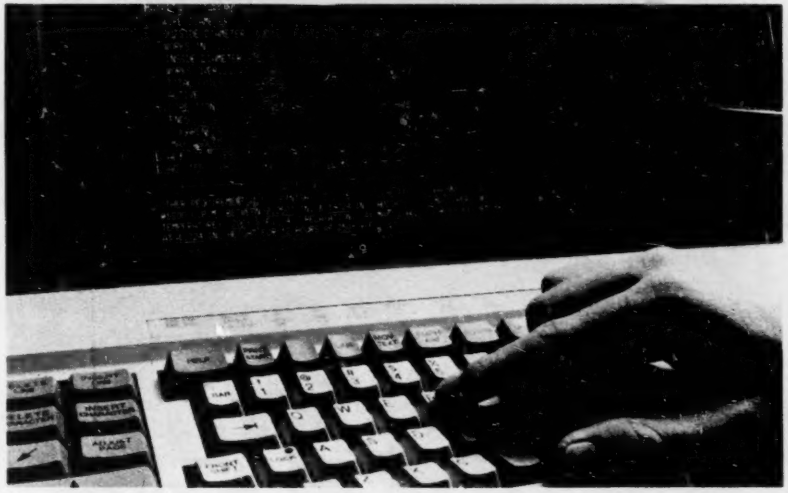

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